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International Association for Dental Research. Proceedings of the Twelfth General Meeting, Chicago, Ill., Mar. 17 and 18, 1934. Compiled by *William J. Gies*, F.A.C.D., *Secretary:*

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INTERNATIONAL ASSOCIATION FOR DENTAL RESEARCH

Proceedings of the Twelfth General Meeting,[1] Stevens Hotel, Chicago, Illinois, March 17 and 18, 1934

Compiled by WILLIAM J. GIES, F.A.C.D., *Secretary*[2]

Columbia University, New York City

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[1] The sessions of the Research Association preceded, by agreement, those of the Eleventh Annual Meeting of the American Association of Dental Schools, in the same hotel, March 19–21. The members of each body were welcome at, and participated in, the sessions of both associations. The chairmen were the President, Dr. E. H. Hatton, Dental School, Northwestern University, and the Vice-president, Dr. T. B. Beust, Dental School, University of Louisville. The annual informal dinner, served to members and guests on the evening of March 18, was attended by 91 persons. The president's address and abstracts of the papers, at the general meeting in 1933, were published in the *Journal of Dental Research*, 1933, *13*, 173–253; June.

[2] Most of the abstracts have been prepared by those who presented the corresponding papers. All revisions have been verified by the authors.

[3] The third session (evening, Mar. 17) was devoted wholly to executive proceedings (page 237).

I. President's Address[4]

Louis-Charles Malassez: 1842–1909

Edward H. Hatton, B.L., M.D., Northwestern University Dental School, Chicago, Ill.

Beginning with Fauchard, the French played an important part in the scientific development of dentistry. In spite of this, since about 1900 nothing of great significance in this field has come out of France. It may be merely an accident, or it may be pertinent, that this Association has no branch societies in France. Since the decades just before the turn of the century supplied the names of three Frenchmen who contributed generously to the dental literature of their time, some scrutiny of this period is warranted. These three men, Magitot, Galippe and Malassez, were primarily physicians and scientists, though their investigations were in part concerned with the oral structures. Of the three, Magitot is first choice for a historical sketch both because of his great activity in this field, and because the French dentists feared and hated him. However, since the name of Malassez is attached to the epithelial structures in the peridental membrane, structures in which I have been greatly interested, he is the most interesting of the three to me. My curiosity is aroused: I must know who he was; I must know how he came to do this work, and something of the man and his times.

Louis-Charles Malassez was born at Nevers, France, September 21, 1842. On his father's side he was descended from an Alsatian family which from time to time had furnished numerous civilian officials in the service of the state, and one may suspect that had the traditions of his paternity prevailed he might have spent his life in similar activity. But fortunately for science, his mother had been raised by an uncle, Senelle, a physician who had served as a surgeon in Napoleon's grand army, who took part in the disastrous campaign into Russia and who was among the survivors of the horrors of the retreat from

[4] Read at the dinner preceding the sixth session (p. 187). In choosing a historical sketch for the presidential address, the author departed from the custom of previous presidents, having "succumbed to the temptation to do a job" that has given him "a great deal of pleasure."

Moscow. Senelle had served his interneship in the hospital of France under such men as Velpeau, Bouillaud and Roche, and his inspiration and example had a tremendous and decisive influence in shaping Malassez' career. With Senelle young Malassez visited patients, he became interested in osteology, and he was made to dissect animals. Senelle made him a present of a microscope, and from this time he wavered but once in his devotion to medicine and histology.

Owing to the duties of his father, the family was compelled to move frequently, but they apparently resided for some time at Compiegne. Here, at the age of eleven years, Malassez was the victim of a serious accident. He was thrown, from the carriage in which he was riding, under the feet of the horses. From this perilous situation he was removed in an unconscious condition, with injuries in the head and chest from which he only partially recovered, suffering for the rest of his life from recurrent headaches so severe as to incapacitate him temporarily. In spite of this his father, a very robust and physically active man, insisted on a strenuous physical education. Malassez was taught to ride a horse without saddle or stirrups. He was taught to swim under the most difficult of situations, such as being cast into the water fully dressed and with stones in his pockets or into weedy waters.

He studied at Chauny and then entered the College Rollin at Paris. Here he surpassed in mathematics and physics, and only failed of attaining the highest prize in physics because of his physical condition at the time of the competitive examination. But in spite of his success in physics and mathematics he persisted in his earlier decision and took up the study of medicine. Under the training of "pere Dupre" he surpassed in anatomy, and found his chief interest at that time in serving as a prosector in this subject. His first hospital service was under Piorry, then next as an externe at the Charité under Broca and Bouillaud. In 1867 he became an interne and served under various clinicians until the outbreak of the Franco-Prussian war. He attached himself at once to the fifth ambulance corps, of which Trelat was the chief surgeon, and served throughout the war with great distinction. At the battle of Artenay, one of the less important engagements of this war, he risked his life in attempting to warn a body of French troups of the danger that threatened them. At this time he

refused the decoration that was offered to him for his gallantry, though this was finally conferred upon him some 24 years later.

After the war he returned to Paris and became a pupil of Potain, who was well known for his work on blood. During this period he studied under the great Claude Bernard, worked with Charcot in internal medicine, and associated with the great and near-great in and outside the field of medicine and biology. He was frequently to be found at the little coffee shop called "The Box" under the Maloine library. This was patronized under the most delightful and familiar conditions by men of catholic tastes from all of the productive fields in science, art and literature such as Cornil and Ranvier, the anatomists, and Flaubert, the author of Salambo. In 1875 he was elected to the chair of anatomy at the College of France, this event marking the end of his period of preparation for his life work. He became a member of the Biological Society, and from this time on devoted himself to the affairs of this society of which he was a substantial patron and eventually president, to research in histological anatomy and pathology, and to teaching.

His scientific achievements were made chiefly in three fields: tuberculosis, histology of the blood, and new growths containing epithelium. His investigations concerning blood, the enumeration of the blood cells and the estimation of hemoglobin, are considered by his contemporaries to transcend those in the other fields. However his name is perpetuated in the literature because of its association with the epithelial bodies found in the investing tissues of the teeth of man and the higher animals, and because of his theories as to the significance of these epithelial structures in relation to the etiology of the tumors and cysts of the jaws. For this reason it is quite likely that posterity will reverse the judgment of his own generation. It seems certain now that Malassez discovered the epithelial cords in the investing tissues of the teeth, and that most of his notions as to their origin and significance have been corroborated by later investigators. On this account, and since his name is attached to these structures, he will be remembered for this work long after his other activities will have been forgotten. He was not a prolific author; at the most he never produced more than ten articles in a year and usually much less than that. Nor was he a great physician, since in only two of the available

biographies of famous physicians is he mentioned, and in these he is disposed of in about one hundred words. At the time of his death short biographies appeared in Bibliographie Anatomie and Folia Hematologia. A year later Galippe, his friend and pupil, published a memorial volume of his work on the epithelial debris of the peridental membrane, with a biographical introduction.

In conclusion I crave the privilege of suggesting (1) that the generation of the French physicians, Magitot, Galippe and Malassez, is important to us because of their contributions to dental science; (2) that research in the territory preempted by dentistry has flourished both within and without the fold; and (3) that this Association is serving a very useful purpose in encouraging research in every branch of science and practice that has any relationship to dentistry. One cannot escape the conviction that where research is flourishing in this field there also will be found members and branch societies of this organization, partly because the workers in this field are drawn to a society that is interested primarily in their activities; but also, let us hope, because this organization is encouraging and stimulating this type of research, both by those in the profession of dentistry and those working in collateral fields.

Bibliography.—(1) Les debris epitheliaux paradentaire: Galippe; Paris, 1910. (2) Malassez: Jolly, *Bibliographie Anatomie*, 19: 296 (1909); Paris and Nancy. (3) Malassez: Nekrolog, *Folia Haematologia*, 9: 101 (1909); Leipzig. (4) Malassez: Biographisches Lexikon; Urban & Schwarzenberg, Berlin. (5) Malassez: Famous physicians of the nineteenth century; Urban & Schwarzenberg, Berlin, 1901. (6) Hatton: The origin and significance of the epithelium found about the roots of teeth, *Archives of Pathology*, 17: 130 (1934).

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III. First Session: Morning, March 17; Abstracts 1–8[5]

1. Histologic Study of Human First Permanent Molar at Birth: Its Postnatal Growth and Development. *Rudolf Kronfeld, M.D., D.D.S., Chicago College of Dental Surgery, Loyola University, Chicago, Ill.* At birth the first permanent molar shows roentgenographically and histologically either no calcification at all, or a very small (about 0.5 mm. high) center of calcification corresponding to the mesiobuccal cusp. During the first three months of postnatal life, additional centers of calcification appear in the following order: distobuccal, mesiolingual, distolingual. From the onset of calcification, these centers are located at their final distance from each other; no actual moving apart of these centers, suggested by some authors, could be observed. At 6 to 8 months, the individual centers of calcification become united. At 3.5 to 4 years, the crown is fully formed and the enamel mature. Occlusal fissures result from early retardation of amelogenesis in certain predetermined areas between the cusps, and from relatively pronounced development of enamel in the immediate periphery of these areas. Throughout growth of germ and formation of roots, the distance between the lowest point of the lower first permanent molar and the mandibular canal remains practically unchanged, tending to prove that Hertwig's sheath is a relatively fixed point during development of the lower first permanent molar, and that the tooth grows generally in an occlusal direction. (To be published in *J. Amer. Den. Assoc.*)

2. Growth in Diameters of Rat Molar Teeth after Eruption. *Henry H. Donaldson, Ph.D., D.Sc., Wistar Institute of Anatomy and Biology, Philadelphia, Pa.* Growth, after eruption, in diameters of molar teeth of albino and of captive gray Norway rats has been followed, for albinos, in four age-groups for each sex; and for captive gray

[5] The session was opened with preliminary executive proceedings (page 237).

Norways, in five age-groups for each sex. There were ten individuals in each age group. The teeth of 180 rats, in all, have been measured with a comparator that recorded values as low as 0.002 mm. In each series, the youngest age-groups were 37 days old—the oldest age-group in the albinos was 949 days; in the captive gray Norways, 672 days. In each animal, measurements were made on both sides of maxilla and mandible for (a) length of rows, (b) length (antero-posterior distance) of M1, and (c) width (transverse diameter) of all molars. In the oldest group, the teeth are always significantly larger than those in the youngest group—in all forms of measurement. In intervening age-groups, values are intermediate. Growth of teeth is most rapid between 37 and 64 days; thereafter, slow but continuous. As teeth are capped with enamel, increase in diameters with advancing age indicates extension of enamel, which therefore grows.

3. Neurons That Innervate Tooth Pulp. *Alton D. Brashear, D.D.S., School of Medicine and Dentistry, University of Rochester, Rochester, N. Y.* Experiments on cats consisted of aseptic removal of pulps of certain teeth. Histological observations are now being made on these pulps to determine type of nerve fiber present. Supplementary study of the Gasserian ganglia, by means of Nissl series-sections, following the time period for maximum nerve-cell degeneration (chromatolysis), is now in progress. The data at hand do not as yet justify any conclusion.

4. Anatomy of Frenum Labii in New-born Infants. *Harold J. Noyes, B.S., D.D.S., M.D., Presbyterian Hospital, and University of Illinois College of Dentistry, Chicago, Ill.* In observations upon 619 living new-born infants delivered on the in- and out-patient services of the Presbyterian Hospital, and in anatomic studies of bodies of 26 infants who died in the first few days of life or at birth (from 12 of which the labial frenum and adjacent tissue were removed for microscopic section), the following findings were recorded: The tissue of frenum labii springs from a relatively wide origin on the inner surface of the upper lip; presents a smooth epithelized septum, which narrows as it progresses posteriorly, and is inserted at the mid-line in the outer layer of periosteum and of connective tissue of the medial suture and crest of the alveolar process. Ridges of the latter are less prominent at this point, forming a groove in which the dorsal extremity of the

frenum lies. A smaller and somewhat similar structure arises from the incisal papilla of the palate, and passes anteriorly to be inserted in this groove. A notch is usually observed at the junction of these structures. This depression was arbitrarily chosen as a basis for classification of the types of frena. The normal frenum is approximately 1.5 to 2 mm. thick at its attachment, and the notch between labial and lingual structures occurs commonly at the mid-point of the alveolar crest, but may vary to labial or lingual in a small percentage of cases; and is occasionally absent. *Histologically* the frenum is composed of areolar and fibrous connective-tissue. A few striated muscle fibers arise from the muscle bundles of the lip on either side of the mid-line, and pass in a diagonal direction medially and posteriorly, but do not reach the attachment at the alveolar process. The loosely arranged fibrous connective-tissue becomes more regular, with strands lying in an antero-posterior direction near the posterior attachment. The connective tissue of the incisal papilla arises about the central vessels, and passes anteriorly, exhibiting an antero-posterior direction in the short cord visible grossly. These fibers mingle with those of the crest of the alveolar process in the region of the notch. There is a ramification of fibers at the central portion of the alveolar process, and a decussation of fibers that pass anteriorly from the incisal papilla. In normal specimens no fibers were found in uninterrupted extension from frenum to incisal papilla.

5. Structure of the Suture. *Frederick B. Noyes, A.B., D.D.S., D.Sc., University of Illinois College of Dentistry, Chicago, Ill.* This preliminary inquiry was undertaken to determine (a) whether study of the structure of the suture would give any light on the rôle of the suture in development; (b) whether growth was going on in that area; and (c) whether it would give any evidence as to the direction and character of the development. It was found that (1) the structure of the suture is strikingly similar to that of peridental membrane. (2) The suture-tissue contains all mechanisms for growth and development, and growth may be in any direction. (3) Histologic examination of an area of a suture shows whether growth is active there or not. (*Angle Orthodontist*, 1934, *4*, 123; April.)

6. Numerical Incidence of Calcifications in Human Pulps. *Warren Willman, B.S., D.D.S., Chicago College of Dental Surgery,*

Loyola University, Chicago, Ill. Incidence of calcification in human pulps was studied in histologic sections of 164 decalcified teeth from patients of different ages; the average number of sections available for each tooth was 13. In 143 pulps (87.2 percent) some form of calcification was observed, varying from fine fibrillar calcic depositions in perineural and perivascular pulpal connective-tissue to large denticles filling almost the entire pulp chamber. Of these 143 teeth, only 21 (14 percent) contained pulps having calcified bodies large enough to be visible roentgenographically, and thus diagnosed clinically. Inasmuch as the limited number of sections through each tooth allowed for examination of only a small portion of the entire pulp, it is probable that the percentage of small pulp-calcifications was higher than 87 percent.

7. HUMAN SALIVA. I. CRITICAL DISCUSSION OF FORMER SALIVARY CALCIUM STUDIES, AND THEIR VALUE IN ESTABLISHMENT OF NORMAL STANDARDS. *Hermann Becks, M.D., D.M.D., D.D.S., and W. W. Wainwright, D.D.S., M.S., George Williams Hooper Foundation for Medical Research, and College of Dentistry, University of California, San Francisco, Calif.* A survey of international dental literature indicated great inadequacy of present knowledge of Ca-content of saliva. Twenty-six papers reported 750 analyses of normal and control individuals. Great variety of technical procedure accounts for wide range of results. Materials used as standards for comparison with data from pathologic cases also showed great variation. Health of subjects was in many instances too readily called good, and need for complete metabolic and physical examinations was ignored. Only the five cases examined by Clark and Shell can be accepted for establishment of normal standards. Several methods used by former investigators were tested on known amounts of Ca and on saliva. The methods of Halverson and Bergeim (modification of Peters and Van Slyke), and of Kirk and Schmidt, were selected as most satisfactory because of accuracy and speed in routine use. Four types of preliminary treatment were tested. Centrifuging without deproteinization gave lower results, and deproteinization without centrifuging slightly higher values, than when both were employed. Omission of both deproteinization and centrifugation led to variable and extremely inaccurate results. Very high values were obtained with the centrifuge-washing

method; very low values with the filter-washing method. These tests demonstrated the necessity to include both deproteinization and centrifugation in preliminary treatment. Deproteinization permits complete precipitation of Ca; centrifugation removes Ca-containing débris. (To be published in *J. Den. Res.*)

8. COMPOSITION OF WHOLE SOUND-TEETH. *Peter J. Brekhus, B.A., D.D.S., and W. D. Armstrong, Ph.D., Laboratory of Physiological Chemistry, and Dental School, University of Minnesota, Minneapolis, Minn.* Analysis of 19 whole, sound, water- and fat-free teeth gave the following results (percent): Ca, 26.05–30.07; P, 12.96–19.71; CO_2, 2.14–3.13; Mg, 0.31–0.89. Composition of the teeth could not be correlated with their position, frequence of decay, or age. The random distribution of results was probably due to differences in proportion of enamel and dentin. Systematic analysis of enamel and dentin has been undertaken.

IV. SECOND SESSION: AFTERNOON, MARCH 17; ABSTRACTS 9–17

9. BACTERIOLOGICAL, CHEMICAL, AND NUTRITIONAL STUDIES OF DENTAL CARIES BY THE MICHIGAN RESEARCH GROUP. *Russell W. Bunting, D.D.S., D.D.Sc., F.A.C.D., School of Dentistry, University of Michigan, Ann Arbor, Mich.* Researches at this School, under the auspices of the Children's Fund of Michigan, warrant the following conclusions: There was no consistent correlation between amounts of salivary total solids, ash, Ca, P, Cl, diastatic activity, pH, CO_2-capacity, or total alkalinity, and activity of caries; and no relationship between intake of Ca, P, and vitamin D, or acid-base dietary values, and activity of caries. Sugar is a very important consideration in caries, a remarkably low degree having been observed in children on a low-sugar diet deficient in Ca, P, and vitamin D. By increasing sugar intake, active caries was induced in children while receiving a diet that was nutritionally adequate. Ingestion of low-sugar diets was conducive to freedom from caries in a majority of individuals. The most constant differential between caries-free and caries-susceptible individuals is that of relative number of B. acidophilus organisms in the mouth; this correlation was approximately 90 percent positive. There is a possible immunologic factor antagonistic to B. acidophilus in blood of caries-free individuals, in whose mouths, as a rule, B. acidophi-

lus does not exist; and when planted therein, promptly disappears; the possibility of increasing immunity against B. acidophilus in caries-susceptible individuals by vaccine therapy is suggested. Inherited tendencies or inherent individual characteristics were, in a small percentage of cases, more important determinant factors in caries susceptibility than ordinary dietary conditions. A great majority of caries-susceptible individuals, however, can apparently be benefited by simple dietary measures. (*J. Den. Res.*, 1934, *14*, 97; April.)

10. Chemistry of Saliva in Relation to Dental Caries. *L. S. Fosdick, Ph.D., and H. L. Hansen, Ph.D., Northwestern University Dental School, Chicago, Ill.* Sound enamel, free from dentin, was shaken, at body temperature for definite periods, with saliva from caries-susceptible and caries-free patients. Fresh salivas, and some that had stagnated for definite periods, were used, and solubility of enamel therein at various stages of stagnation noted. Salivas of all individuals, whether caries-free or caries-susceptible, were found to be (at least) saturated with tri-calcium phosphate. Definite difference between saliva from caries-free and caries-susceptible patients was noted.

11. Permeability Tests on Teeth with Pulpal Involvement. *Theodore B. Beust, D.D.S., M.D., F.A.C.D., School of Dentistry, University of Louisville, Louisville, Ky.* Extending an investigation to determine sclerosis content of 70 intact teeth of adults, a similarly conducted test was made of 110 carious teeth with pulpal involvement. Of the teeth of the first group, 92 percent exhibited sclerosis; of the second, only 15 percent. Sclerosis, or factors causing sclerosis, evidently contribute to a condition of immunity to caries. (*J. Den. Res.*, 1934, *14*, 93; April.)

12. Gram-negative Cocci of the Mouth. *Basil G. Bibby, B.D.S., Rockefeller Fellow in Dentistry, School of Medicine and Dentistry, University of Rochester, Rochester, N. Y.* Direct counts of bacteria in smears from buccal mucosa of nine persons showed that Gram-negative cocci represented from 42 to 100 percent of the total flora. Similar examinations of smears from washed surfaces of lower molars of the same individuals showed that these cocci constitute from 14 to 71 percent of the total. By means of hemolytic activity and colony morphology, 4 anaerobic and 39 aerobic strains were divided into 3

anaerobic and 20 aerobic types, but instability of both characters rendered them valueless for purposes of classification. These strains were divided into 2 anaerobic and 5 aerobic types by means of fermentation reactions on glucose, maltose, sucrose, lactose, mannite, and salicin. The constituent members of these groups were quite dissimilar in colony characteristics. A satisfactory basis for classification of these organisms is being sought.

13. Inhibition of Bacterial Growth by Human Saliva. *O. W. Clough, B.S., D.D.S., Rockefeller Fellow in Dentistry, School of Medicine and Dentistry, University of Rochester, Rochester, N. Y.* Inhibiting effects on bacterial growth were studied by placing filtered and unfiltered salivas in separate wells in agar plates heavily streaked with a test organism. Douglas broth in another well in the same plate was used as a control. The organisms were *Staph. albus, Bact. dysenteriae Shiga, B. subtilis, Proteus vulgaris, Sarcina lutea, Bact. coli, M. lysodeikticus, Bact. typhosus,* and *B. megatherium.* Salivas from ten people were tested on one or more different days. A zone of inhibition, 4 mm. or wider, invariably occurred around the wells containing fresh unfiltered saliva in plates inoculated with *B. megatherium* and *S. lutea.* Degrees of inhibition of *B. subtilis, P. vulgaris, B. dysenteriae, B. coli, M. lysodeikticus,* and *S. albus,* diminished in the order listed. The first four showed a zone more than 2.5 mm. wide; the last two, 0.5 mm. or less. The same individual's salivas gave similar results when tested on different days. Filtered saliva, excepting a few samples, showed no inhibitory effect. Of forty-one different salivas tested against *Lactobac. acidophilus,* using wells in poured plates of Kulp's tomato-juice agar, all but one inhibited growth, the zone of inhibition varying from 0.5 mm. to 6 or 8 mm. Filtered saliva showed no inhibitory effect.

14. Effect of Brushing Teeth, Before Retiring, on Number of Bacteria Removable in Mouth Rinsings Next Morning. *M. Siegel, D.D.S., and J. L. T. Appleton, Jr., B.S., D.D.S., School of Dentistry, University of Pennsylvania, Philadelphia, Pa.* The Breed method for counting bacteria was employed. (1) Taking number of bacteria in mouth-rinsings on first arising in the morning (when the teeth had not been brushed on retiring the night before) as 100 ±7%, then number in the mouth-rinse on first arising was 63 ±6%—when the teeth had been brushed on retiring the night before. (2) Taking

number in the mouth-rinse at 12.30 p.m. (after lunch) as 100 ±13%, then number in the mouth-rinse before dinner (4.45 p.m.) was 145 ±4%—when neither food nor drink had been taken in the interval, and there had been no smoking. (3) Taking the number in the mouth-rinse at 12.30 p.m. (after lunch) as 100 ±13%, then number in the mouth-rinse before dinner (4.45 p.m.) was 137 ±10%—when a cake of chocolate had been eaten at 2.30 p.m., and nothing else taken into the mouth. It appears that chocolate under these conditions did not materially affect number of bacteria in mouth-rinsings.

15. SOLUTION TENDENCY OF APATITE IN SALIVA. *Peter J. Brekhus, B.A., D.D.S. and W. D. Armstrong, Ph.D., Laboratory of Physiological Chemistry, and Dental School, University of Minnesota, Minneapolis, Minn.* Two cubical pieces of apatite were set, with one surface exposed, in a removable bridge occupying the space of an extracted upper left first molar. Photomicrographs showed insignificant change; loss in weight was not over 0.1 percent during a year's exposure to saliva. The resistance to solution of apatite, in an average mouth, is thus compatible with x-ray spectrograph and chemical indications that the mineral material of enamel is apatite.

16. ANIMAL EXPERIMENTS WITH BESREDKA'S "ANTIVIRUS." *Katherine Polevitzky, M.D., and J. L. T. Appleton, Jr., B.S., D.D.S., School of Dentistry, University of Pennsylvania, Philadelphia, Pa. Staph. aureus* "antivirus" was prepared according to Besredka. A flask of sterile uninoculated broth was kept under the same conditions as the inoculated flask and underwent the same treatment. This was called "control filtrate." For a second control, fresh sterile broth was employed. Two dilutions of "antivirus" with appropriate controls were each inoculated into nineteen mice. The following data, for percentage of survivors, indicate that, if the inoculum is not too large, the "antivirus" exerts some protection:

Dilutions of "antivirus"	*Culture, plus control filtrates*	*Culture, plus "antivirus"*	*Culture, plus fresh sterile broth*
1 (culture): 1 (diluent).....	52	47	42
1.5 (culture): 0.5 (diluent).....	31	52	31

17. COPPER AMALGAM. *F. E. Harris, D.D.S., University of Toronto, Toronto, Canada.* Copper amalgam is a known factor in respect to beneficial properties, but unknown as to toxic effects. This uncer-

tainty suggested the possibility of mercurial poisoning by amalgam fillings. In microscopic analysis of body fluids of groups of patients, with amalgams present, no traces of mercury were found. Our further work warrants these conclusions: (1) Copper amalgam exhibits definite bactericidal action, the antiseptic property being permanent and (2) due to action of mercury and copper in the approximate proportions of 1 to 50,000 of mercury, and 1 to 200,000 of copper; (3) the action being increased and prolonged by the catalytic action of two metals on each other. (4) Metallic mercury is insoluble in ordinary body fluids, excepting in presence of an oxidizing agent (KI) and an alkali chloride (NaCl). (5) Mercury in the mouth, in the form of copper amalgam or silver amalgam, is not poisonous. (6) Amalgam is not a poisonous material, as it can be taken internally with no ill-effects.

V. Fourth Session:[6] Morning, March 18; Abstracts 18–29

18. Gross Radiographic and Histologic Changes in Jaws and Teeth of a Hypopituitary Patient. *Isaac Schour, B.S., D.D.S., M.S., Ph.D., and Allan G. Brodie, D.D.S., M.S., College of Dentistry, University of Illinois, Chicago, Ill.* The patient, 16 years old, was a well-developed male having the general appearance of a 9-year old boy; genitalia, small and infantile. The oral cavity revealed a Class-I malocclusion with markedly tapering arches. Deciduous upper and lower right canines were present; permanent canines and lower left bicuspids had not erupted; second molars were in place. The gross dental picture was that of an individual between 11 and 12. Apices of lower molars were in close proximity to the lower border of the mandible. Maxillary and frontal sinuses and sella turcica were small. Superposition of the patient's cephalometric tracing upon that of an average 9-year old showed lack of lengthening of cranial base and marked lack of vertical growth. The palate had failed to descend by $\frac{3}{16}''$ and the lower border of the mandible by $\frac{3}{8}''$; the occlusal plane had not gone downward and forward. Superposition of the patient's tracing on that of a Bolton Standard of the same chronological age (16—*fig. 1*) revealed changes that were identical in character but

[6] The third session (evening, March 17) was devoted wholly to executive proceedings (p. 237).

much greater in amount. Failure in facial growth amounted to $\frac{1}{8}''$ vertically and $\frac{3}{4}''$ horizontally. Crowns were normal in size and shape in all erupted teeth. Roots and pulps of all teeth, excepting incisors and first molars, showed persistence of juvenile characteristics and abnormal contour; lower third molars, delayed calcification of crowns; alveolar bone, disturbance in calcification and a wide lamina dura, which in late radiographs evidenced prominent resorption. Enamel (studied in three deciduous teeth) was normal. Dentin next

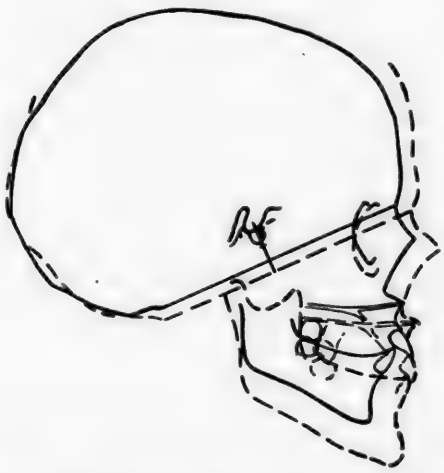

FIG. 1. Patient's cephalometric tracing superimposed on that of a Bolton standard of same chronological age—16. Unbroken outline = patient's tracing. Broken outline = Bolton standard.

to pulp showed prominent scalloped surface, which was associated with atrophy of alternate groups of odontoblasts; root surface, little resorption and some ankylosis. Tissue overlying submerged permanent cuspids was scar tissue, and contained groups of degenerating mast cells and calcified epithelial rests. (To be published in *Angle Orthodontist.*)

19. IMPORTANCE OF BIOPSY IN EARLY DIAGNOSIS OF CARCINOMA OF THE LIP. *E. B. Fink, Ph.D., M.D., Chicago College of Dental Surgery, Loyola University, Chicago, Ill.* It is generally agreed that

the greatest hope for permanent cure of malignant tumors lies in early recognition, and prompt and radical removal. In carcinoma of the lip, early excision may be done with practically no mortality. The sooner diagnosis is made, the more favorable the prognosis for complete recovery, particularly in younger individuals. The usual history of epithelioma of the lip is a duration of weeks or more often of several months, beginning as a papule at the muco-cutaneous junction lateral to the midline. On squeezing the papule a drop of serum exudes; this is repeated until a crust forms; the crust is removed; and finally an ulcer develops having typical characteristics of malignancy. In a public hospital early cases, as a rule, are uncommon. During the last three years, in the oral-surgery service of Dr. Wm. H. G. Logan at the Cook County Hospital, eight biopsy specimens have been obtained from suspected malignant lesions in early stages and examined in serial histologic sections. Clinically the lesions are of three types: fissure or crack of lip which fails to heal, papule, and shallow ulcer with induration. Microscopically, criteria of malignancy consisted of invasion of epithelium deep into submucosa beyond basement membrane; anaplasia of epithelium, as evidenced by presence of mitotic figures; and formation of epithelial pearls. Of these, anaplasia is most significant.

20. Comparative Study of X-ray Absorption Properties of Normal and Pathological Dentin by Densitometric and Ionization Methods. *G. Van Huysen,* D.D.S., W. F. Bale,** A.B., and H. C. Hodge,* Ph.D., School of Medicine and Dentistry, University of Rochester, Rochester, N. Y.* The precision densitometric roentgen-ray absorption method previously reported by Warren et al., and applied to certain teeth showing increased roentgen-ray opacity under dental caries by Van Huysen et al., was applied to three teeth, further illustrating increase in roentgen-ray opacity under dental caries. Certain areas under caries were shown to have increased roentgen-ray absorption of 5, 10 and 40 percent compared to "normal" dentin in the same tooth. Interpolated values for dentin, in terms of mm. of Al, were expressed with an error of not more than 3 percent. Roentgen-ray absorptions of the same tooth slabs were measured by a standard ionization-chamber method with an error of not more than 5 percent.

* Rockefeller Fellow in Dentistry. ** Research Assistant in Radiology.

Confirmatory data were obtained. The tooth slabs were then reground from 0.85 ± 0.01 mm. to 0.19 ± 0.01 mm. and, using soft Grenz (8 KV) rays, the absorption of the areas reported above were measured by both densitometric (error not known) and ionization (error approximately 5 percent) methods. Concurrent and confirmatory data were obtained. An area of transparent secondary dentin filling the horn of a buccal cusp in one tooth showed "normal" absorption values. Areas of carious dentin and secondary dentin near the pulp chamber showed low absorption values. (To be published in *Dental Cosmos*.)

21. Histopathological Changes in Pulp and Dentin under Different Filling Materials. *Russell A. Dixon, D.D.S., M.S.D., Dental School, Howard University, Washington, D.C.* Cavities were prepared in eight teeth of each of five dogs, and filled with different materials (copper cement, guttapercha, and amalgam). After periods of 15, 20, 25, 30, and 180 days, the filled teeth were extracted. Responding to external irritation, pulp deposits secondary dentin at the base of injured dentinal tubules. That excess of Ca salts at the site of initial deposition of secondary dentin is protective, in the sense that it seals-off pulp from further external injury, has not yet been shown, the deposit seeming to be *inter*tubular rather than *intra*tubular. Effects of various types of fillings upon dentin and pulps can be determined accurately only after more careful studies of the nature and extent of any degenerative change caused by cavity-preparation itself. Such knowledge should be the rational basis for any form of surgical operation upon a tooth, whether extensive as for a crown, or restricted as for a simple cavity. (Abstract: *J. Amer. Coll. Dent.*, 1934, *1*, 57–58; April. To be published in *J. Den. Res.*)

22. Influence of Time Consumed in, and of Manner of, Making the Mix upon the pH of Silicate Cements. *J. A. Eberly, Jr. D.D.S., School of Dentistry, University of Pennsylvania, Philadelphia, Pa.* Pulp involvement has often been ascribed to silicate fillings. A possible factor is the acidity of cement. The average mixing-time recommended is about one minute, during which the powder is fractionally added to the liquid. As an alternative procedure, mixing-time was reduced to 30 seconds and *all* powder added at once. The results, tabulated below, indicate that the second procedure does not

decrease setting time, nor cause generation of significant quantities of heat. Consequently, when it is desired to lessen ill effects imputed to acidity, this manner of mixing seems indicated:

Mixing time: Seconds	*pH: elapsed time after mixing*					
	Minutes			*Days*		
	20	*30*	*60*	*1*	*7*	*30*
60	4.2	5.4	5.5	5.5	5.3	5.5
30	6.3	6.4	6.4	6.4	6.5	6.5

23. Changing Principles of Retention and Full-denture Design. *George B. Denton, Ph.D., Northwestern University Dental School, Chicago, Ill.* The chief changes in the design of full dentures have been brought about by changes in principles of retention. This development has gone through four stages from early in the 18th century to the third decade of the 19th: (1) The earliest dentures, retained by intermaxillary springs, were adapted merely to the crest of the ridges on which they sat. This type is represented by Fauchard, and continued to exist, with other types, into the 19th century. (2) To increase stability in some cases, beginning about the middle of the 18th century, the base was made hollow and extended over the ridges. The earlier examples were only slightly hollowed, but later, in the 19th century, they were constructed with deep flanges. (3) About 1800, retention by close adaptation was introduced and occasionally substituted for intermaxillary springs. Probably in the earliest retention by close adaptation, both upper and lower dentures, like those retained by intermaxillary springs, were constructed similarly with deeply flanged base-plates. (4) To secure greater retention for dentures held by close adaptation, the base of the upper denture was extended onto, and finally across, the hard palate. The earliest discovered records of such extension are after 1830.

24. Comparative Strength, Accessibility, and Convenience of Removal of a Tube-form of Post or Dowel as Compared to Some Solid Types Commonly in Use for Crown Restorations on Devital Teeth. *Paul H. Jeserich, A.B., D.D.S., School of Dentistry, University of Michigan, Ann Arbor, Mich.* When a hollow tube and a solid post, made from the same material, are of equal weight per unit length, the tube is stronger and of greater diameter. When a metal post has half its diameter hollowed out concentrically, one-quarter of

the material has been removed; and, according to formulae used in computing comparative bending strengths of tubed and solid posts, bending strength has been reduced but one-sixteenth. Comparative laboratory tests of solid posts and of those with a lumen of half the outside diameter, both of the same material, indicated that the yielding points in the two types, when equal loads were applied, were not over 15 percent apart. This decrease in bending strength is easily offset by using iridio-platinum or a clasp-metal alloy, the yielding point of which is so high that the slight loss due to hollowing out half its diameter still gives a great margin of safety. Use of several of these posts in the mouth, 14- and 16-gauge, with a lumen of half the outer diameter, has borne out the mathematical and laboratory findings as far as strength is concerned. In fact, practical application and tests have justified use of a 14-gauge iridio-platinum post with as much as three-quarters of its diameter concentrically hollowed out, but this extreme is not necessary. A 14-gauge post is 0.064 inch in diameter; if half the diameter is hollowed out, the lumen is 0.032 inch in diameter. A post with a lumen of 0.032 inch in diameter will accommodate all hand reamers, files, and broaches in use in root-canal surgery, as well as the first four sizes of engine reamers, without any semblance of tightness. Removal of these posts is accomplished by inserting the point of a flame-shaped fissure bur, of the same diameter as the post, in the lumen previously filled with oil, and drilling the post from the inside out, with the lumen acting as a guide to keep the flame-shaped bur centered during the operation. Little if any loss of root structure is required, and the amount of time consumed is negligible. (To be published in *J. Amer. Den. Assoc.*)

25. Human Saliva. II. Technical Procedure for Calcium Determination. *W. W. Wainwright, D.D.S., M.S., George Williams Hooper Foundation for Medical Research, and College of Dentistry, University of California, San Francisco, Calif.* In most salivary-Ca methods interfering organic matter is removed either by ashing or deproteinization. Either procedure alone permits inclusion of Ca in variable quantities of débris and cells. Becks and Wainwright showed that, in saliva of a single individual, centrifugation caused variation in Ca results (abstract 7). In further tests on ten individuals, *six* showed no loss in centrifuged samples; for *four*, all results

were from 6 to 30 percent under values for uncentrifuged samples. On reëxamination of three of the last samples, the difference disappeared in one case; in another it remained as before; in the third, the minus difference increased from 20 to 37 percent, which lower value could not be correlated with viscosity, cell content, visible débris, quantity of protein precipitate, character of filtrate, oral hygiene, age, or rate of flow. We conclude that lower values for centrifuged samples are not due to loss of Ca from saliva, but to elimination of Ca-containing débris. For this reason, preliminary centrifugation is recommended. A complete description is given of two Ca-methods modified for use in salivary analysis. Preliminary treatment includes deproteinization in addition to centrifugation. Two washing techniques are described: centrifuge-washing technique of Halverson and Bergeim (as described by Peters and Van Slyke), and micro-filter technique of Kirk and Schmidt. (To be published in *J. Den. Res.*)

26. The Tooth Germ in Acute Scurvy. *Paul E. Boyle, D.M.D., Children's Hospital, and Harvard Medical and Dental Schools, Boston, Mass.* An histopathological study was made of permanent and deciduous tooth germs in two cases of acute scurvy in infants, 8 and 11 months old, respectively, in whom rib, femur, and mandible showed striking changes from normal that in all respects were similar to those in growing bones of guinea pigs on diets free from vitamin C. Each tooth germ was normal in development; enamel and dentin-forming organs were of average size; ameloblasts and odontoblasts were, for the most part, well arranged columnar cells. Minute hemorrhages, and small cysts containing clear fluid, were noted in the enamel organ of several tooth germs of the *younger* case; occasional minute hemorrhages disrupted odontoblasts, and there were areas of edema in pulps. Tooth germs of the *older* child showed no variation from normal. This striking difference from findings in constantly growing incisors of guinea pigs, where lesions in acute scurvy are more marked than in growing bones, might be due to two factors: guinea-pig incisors (1) grow at the rate of several mm. per week (human teeth during most rapid formation, only a few mm. per year), and (2) are subjected to severe functional stresses (from which unerupted teeth are protected).

27. Heterotopic Formation of Tooth Elements. *C. B. Huggins, M.D., H. R. McCarroll, M.D., and A. A. Dahlberg, B.S.D., D.D.S.,*

Department of Surgery, University of Chicago, Chicago, Ill. Extraoral formation of dentin and enamel from soft tissues was accomplished, in dogs, by homogeneous transplantation of developing tissues of permanent canine teeth to the abdominal wall. Young dogs about 5 to 8 weeks old, with deciduous teeth still in place, were selected for operation under ether anesthesia, with asepsis in all cases. Incision was made in buccal mucosa over the ridge of the deciduous canine tooth, periosteum of maxilla reflected, buccal plate of maxilla over canine tooth removed with a chisel, and *unerupted canine tooth with surrounding membranes extracted.* Membranes were slit, and tooth shell was removed and discarded. In many cases, soft tissues were x-rayed to detect presence of calcified material. Biopsies of ameloblast layer and of pulp were taken in all cases, and remaining tissues transplanted in abdominal wall between external and internal oblique muscles. Abdominal wounds were closed with silk. In many dogs, in addition, the mandibular unerupted canine was also removed and treated similarly. Membranes were transplanted in various combinations: in some, pulp and ameloblast layers, together; in others, separately; in others, two pulps were used. The data in this preliminary report were gathered from 40 dogs on stock diet. It was difficult to remove ameloblast layer without including fragments of enamel or bone, but pulp with odontoblast layer was more easily removed, and with great regularity was free from calcified material.

Results. (a) *Odontoblast layer and pulp:* led constantly, in 16+ days, to formation of dentin, varying from small spherical denticles to large irregular masses that included fibroblasts and were present in a smaller number than in bone, owing presumably to proximity of connective tissues, whose cells became engulfed in dentin. Dissociation of odontoblasts and immediately subjacent pulp tissue from more centrally located pulp-cells without odontoblasts, and transplantation of these specimens, led to formation of dentin in the former, none in the latter. (b) *Ameloblast layer, alone:* was less successfully freed from calcified elements than the odontoblast-pulp system; consequently enamel was almost always found in the transplant at necropsy; it was exceedingly difficult to tell whether new enamel had formed, but we believe it formed in small amount. Columnar epithelial-cells were never preserved, and the end result was a stratified squamous-

epithelium resembling gingival epithelium. (c) *Ameloblast and odontoblast layers, together:* led to far greater amounts of calcified tissue than either layer alone. If transplanted, so that an approximately normal relationship obtained, cylindrical epithelium survived and proliferated, and was separated from the odontoblast layer by typical enamel and dentin. If this relationship was purposely not sought, relatively large areas of dentin, and dentin-bone were found, with occasional islands of squamous epithelium scattered about. Hertwig's sheath was successfully transplanted in some dogs.

28. Appositional Substitution of Dentin by Bone. *C. B. Huggins, M.D., and H. R. McCarroll, M.D., Department of Surgery, University of Chicago, Chicago, Ill.* These experiments were designed to throw light on the creeping replacement of dentin by bone that occurs under many conditions, including trauma and avitaminosis. Hunter, Boulger, and others have reported heterogeneous transplantation of teeth to soft tissues. Under ether anesthesia, deciduous canine teeth of young dogs were cut through, with saw or rongeur, distal to the gingival margin so that bone was not included, and, after removal of the pulp, transplanted between muscles of abdominal wall of the same dog. In each of 9 dogs, the tooth became encapsulated by connective tissue, and bone was found irregularly in this tissue in the "pulp;" in many places a narrow strip of bone replaced the margin of dentin bordering on "pulp." However, immersion of teeth in boiling water for ten minutes, before transplantation, prevented formation of bone in both dental locations.

29. Method for the Separation of Enamel from Dentin and Cementum. *Peter J. Brekhus, B.A., D.D.S., and W. D. Armstrong, Ph.D., Laboratory of Physiological Chemistry, Dental School, University of Minnesota, Minneapolis, Minn.* A solution of alcohol and bromoform (sp. gr., 2.53 at 25°C.) permits dentin (and cementum) to float, and enamel to sink, when finely pulverized, dry, and fat-free whole-tooth is mixed with the liquid. A specially designed separatory flask is used to facilitate separation of enamel and dentin fractions. A technique has been developed which permits separation of pure enamel from dentin, microscopic and chemical illustrations showing that the ensuing product is pure enamel, and that the yield is very nearly the theoretical quantity.

VI. Fifth Session: Afternoon, March 18; Abstracts 30–40

30. Epulis: Localized Osteitis Fibrosa. *H. R. Churchill, D.D.S., D.M.D., Dental School, University of Pennsylvania, and American Oncologic Hospital, Philadelphia, Pa.* During many observations on epulides, it was noticed that these growths presented different histologic appearances in different patients, and at different stages of development that seemed characteristic of localized osteitis fibrosa. Histological characteristics of the latter disease, compared with those of epulis, indicated striking analogy between them; not only the pathosis as such, but also the etiology and reaction to radiation, seemed to point to marked similarity. When sections of osteitis fibrosa and epulides were studied in detail, the former condition reflected in every respect that of the latter. The reason why, in the past, epulides have not been regarded as osteitis fibrosa is explained by the fact that pathologists, for obvious reasons, do not receive sufficiently large resections of involved areas in which granulation tissue would be immediately related to fibrous changes in bone marrow, and to lacunar absorption of alveolar process. As it is, they examine granulation tissue only. It is felt that accompanying roentgenograms would in some cases be valuable diagnostic aids. In accordance with views expressed in recent articles on the subject, in foreign literature, we interpret epulis as a localized osteitis fibrosa, and different forms of epulides as various stages of the same process.

31. Histological Differentiation Between Certain Dentigerous Cysts and Ameloblastomata. *H. R. Churchill, D.D.S., D.M.D., Dental School, University of Pennsylvania, and American Oncologic Hospital, Philadelphia, Pa.* Cases have come under our observation in which dentigerous cysts of jaws seem to assume ameloblastomatous (adamantinomatous) characters. Sections of these cases, and of ameloblastomata proper, were subjected to careful microscopic examination. The wall of a dentigerous cyst may become quite erratic in behavior—may show certain epithelial proliferations comparable with those in the external epithelial layer of cells of the enamel organ. These proliferations may show invasive characteristics. Separate strands of epithelial cells may join, and form solid areas of epithelial cells or include some connective tissue, which may be vascu-

larized. Such tissue, invested in several epithelial-cell layers, may suggest ameloblastoma. Degenerative processes in connective-tissue inclusions of epithelial tissue further tend to obscure diagnosis. When the genesis of the complicated structure of certain walls of dentigerous cysts was followed in sections, and involved tissues were properly interpreted, it was found that ameloblastomata and atypical walls of dentigerous cysts were definitely differentiated.

32. Histologic Study of the Muscles of the Upper Lip and Their Attachment to the Maxilla: Special Reference to Surgical Correction of Congenital Cleft of the Lip. *W. H. G. Logan, D.D.S., M.D., F.A.C.S., F.A.C.D., Chicago College of Dental Surgery, Loyola University, Chicago, Ill.* To determine distribution of muscles of the upper lip and their attachment to bone, serial sections were cut in a horizontal plane through the complete upper jaw, including upper lip, cheeks, and nose, of a still-born infant with bilateral complete cleft of lip, jaw, and palate. These sections showed that the central portion of the upper lip (central tab), which is attached to the prominent premaxilla, does not contain muscle fibers. The premaxilla itself contains germs of deciduous and permanent central incisors lying in atypical, misplaced positions. In fragments of the upper jaw distal to the cleft, the deciduous lateral-incisor germ lies in a rotated position, its incisal edge pointing mesially into the cleft. Distribution of muscles in the mesial end of the distal fragment and around the alae of the nose was studied, with reference to possibilities of surgical reconstruction of lip and nose in cases of harelip. Of special importance is restoration of continuity of bone in the region of the cleft, to give necessary bony support and area of attachment to muscles of the lip and ala (m. nasalis).

33. Oral Observations in a Case of Periodic Agranulocytosis. *Paul C. Kitchin, M.S., D.D.S., Dental College, Ohio State University, Columbus, Ohio.* Agranulocytic conditions are of particular interest to the dentist because of accompanying stomatitis. The recurrent or periodic type—only one case of which has previously been detailed in the literature—is specially important because it affords opportunity to observe repeated reaction of oral tissues to this general condition. Clinical observations on oral mucosa, smears from representative gingival crevices, and differential blood-counts, were

correlated in this case over a period embracing a number of granulocytic cycles. The data indicated that rise and fall of granulocytes was inversely related to rise and fall in number of Vincent spirochetes in gingival crevices. Clinical manifestations of inflammation and repair in marginal gingivae, and in localized areas of tongue and buccal mucosa, accompanied fluctuations in number of spirochetes. Distinctive pallor of the soft palate characterized periods of low granulocyte count. (To be published in *J. Den. Res.*)

34. EXAMINATION OF COMMERCIAL STOCK SOLUTIONS OF PROCAINE AND EPINEPHRINE FOR SULPHUR DIOXIDE. *Samuel M. Gordon, Ph.D., Bureau of Chemistry, American Dental Association, Chicago, Ill.* A series of ready-made solutions containing procaine hydrochloride and epinephrine, as sold to dentists, were examined for bisulphite. These solutions are marketed in bottles, all-glass ampules, half-ampules with rubber stoppers (Novampuls, Unitubes), and cartridges (Carpules, Anestubes, Proco Sol, etc.). Dentists are frequently advised by interested representatives of the absence of "preservatives." All products examined contained bisulphite, amounts (sodium bisulphite) varying widely, not only among various brands, but also among individual samples of one brand.

35. REPLANTING DOG TEETH. *Wm. G. Skillen, D.D.S., and G. R. Lundquist, D.D.S., Northwestern University Dental School, Chicago, Ill.* The object in studying tooth replantation was to test a principle in coordinate physiology controlling the relation of epithelium to tooth and investing tissues, as well as relationship between cementum, peridental membrane, and alveolar bone. Success of plantation depended upon (a) careful handling after extraction, (b) proper replacement in alveolus, and (c) re-adaptation of soft tissues, together with (d) perfect fixation. Leaving tooth out of socket for more than a short period, manual manipulation, or scraping, seemed to stimulate active resorption processes in investing tissue after tooth was replanted. Lack of proper positioning of tooth often developed active resorptions, deposition of bone, or both. Ankylosis is due not to interlocking of bone and cementum as is often believed, but to direct union. Epithelial proliferation over severed surface of peridental membrane was more or less the rule, even though gingivae were well adapted to tooth surface. Any interference with reattachment of

peridental membrane terminated in deep, epithelial-lined pockets; rapid and successful reattachment resulted in shallow ones. Epithelium always tends to grow rapidly—an important consideration in any treatment of pyorrhea pockets.

36. ALLERGIC NATURE OF GINGIVITIS AND PERIODONTOCLASIA. *J. C. Healy, Ph.G., M.D., Medical and Dental Schools, Tufts College, Boston, Mass.* Gingivitis and periodontoclasia were studied from the point of view of systemic diseases. Blood smears from 101 cases revealed eosinophilia in a majority. Since this is a constant finding in most allergic conditions, the patients were skin-tested with all food, contact, animal emanation, and incidental proteins available. In a large percentage, idiosyncrasies to one or more substances were etiological factors. Removal of these contacts resulted in clinical improvement. All cases had allergic backgrounds despite the oral bacteriology. They were all relieved by dietary control or removal of offending protein. Cases having local gingival eosinophilia were improved but not cured, the local process having extended for too long a time. (Abstract: *J. Amer. Coll. Dent.*, 1934, *1*, 49; April.)

TABLE 1

Range of personality gradings of practising dentists (Group A) and 1933 dental senior class (Group B)

GRADE	PERCENT	Group range[1] A	Group range[1] B	PERCENT	GRADE
A	10	4.5–4.6	4.3–4.6	10	A
B	20	4.1–4.2	3.7–4.1	20	B
C	40	3.9–4.0	3.0–3.6	40	C
D	20	3.4–3.7	2.5–2.9	20	D
E	10	2.7–3.2	2.3–2.4	10	E

[1] Personality mean: Group A = 3.91; Group B = 3.31.

37. STATISTICAL RESULTS OF PERSONALITY SURVEYS OF PRACTISING DENTISTS. *R. K. Brown, M.S., D.D.S., F.A.C.D., School of Dentistry, University of Michigan, Ann Arbor, Mich.* A personality survey of practising dentists was made, using the graphic rating scale (1) as adapted for study of dental students and dentists (2). This scale has recently been revised, the number of traits having been reduced to ten and the technical procedures having been simplified (3). In com-

paring the results with those of personality analyses of the senior dental students of the Class of 1933 at the University of Michigan, which were made by members of the faculty, it was found that the personality ratings of the students gave a mean average of 3.31 (basis, 1 to 5), while that of the dentists was 3.91. The mean average for each of the

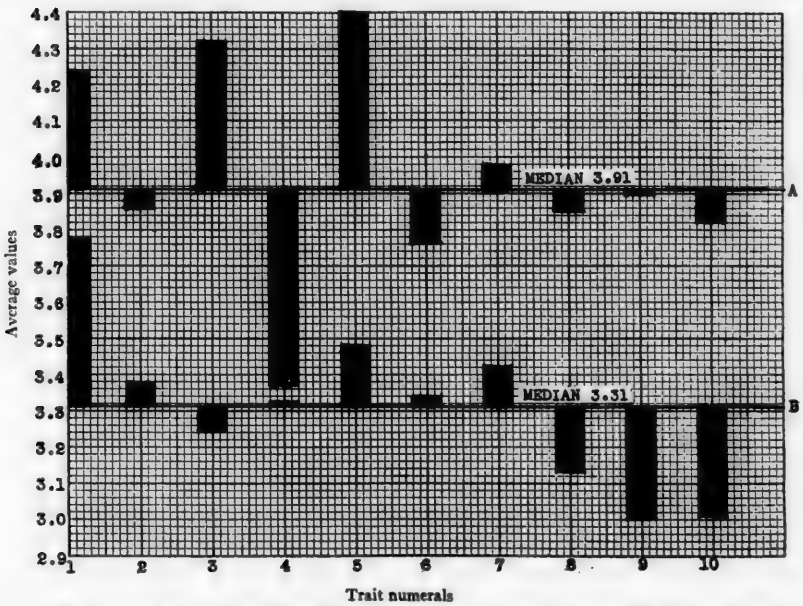

FIG. 2. Variation of each trait from the mean, or average personality, for each group: *A*, practising dentists. *B*, senior dental students, 1933. Trait numerals, and average values for Groups *A* and *B*, respectively: (1) Honesty and integrity, 4.24, 3.78. (2) Aggressiveness and initiative, 3.86, 3.38. (3) Resourcefulness and self-sufficiency, 4.32, 3.25. (4) Emotional stability, 3.37, 3.32. (5) Industriousness, 4.40, 3.48. (6) Personal appearance, manner, and bearing, 3.76, 3.34. (7) Tact and courtesy, 3.98, 3.42. (8) Keen observation with retentive memory, 3.87, 3.13. (9) Accuracy, 3.90, 3.00. (10) Introversion-extroversion, 3.82, 3.03. *Average:* 3.91, 3.31.

ten traits for the students was considerably lower than that for each trait for the practising dentists (*table 1*). This seems to indicate that the dentists selected raters who were favorably inclined toward them and that the results, therefore, contained the 'halo effect' which should be avoided. The members of the faculty were not influenced in this

manner. This is evident in the more balanced, and hence more valuable, results obtained in rating the students. In future surveys, therefore, each dentist should present a list of thirty names from which the person making the study may select ten or fifteen as raters. The graphs in *fig. 2* illustrate these points. *Bibliography* (R. K. Brown): (1) Research in use of rating scale as means of evaluating personalities of senior dental students. *J. Den. Res., 10:* 271–279, 1930; June. (2) Preliminary report of personality traits essential to success of the practising dentist. *Ibid., 11:* 363–368, 1931; June. (3) Analysis of personality of the successful dentist. *Dental Cosmos, 75*: 749–757, 1933; Aug.

38. Some Relevant Conditions of Root-end Resorption. *Hermann Becks, M.D., D.M.D., D.D.S., George Williams Hooper Foundation for Medical Research, and College of Dentistry, University of California, San Francisco, Calif.* Of 54 patients with extreme root-end resorption, 35 had received previous orthodontic treatment; 19 had not. Both groups of patients were examined physically, and special attention was paid to endocrine disturbances and other constitutional diseases. (1) Of patients with root resorption and previous orthodontic treatment, 60 percent revealed definite hypothyroidism (diagnosis supported by clinical symptoms and laboratory tests); 23, hypothyroidism plus other endocrine disturbances; 11.3, endocrine disturbances without hypothyroidism; 5.7, other diseases. The frequency of hypothyroidism, and of hypothyroidism plus other endocrine disturbances, was 83 percent; that of all endocrine disturbances coexistent with root-end resorption was 94.3. (2) Of all patients with root-end resorption, but without previous orthodontic treatment, 47.3 percent also revealed hypothyroidism; 31.5, hypothyroidism plus other endocrine disturbances (total, 78.8); 10.6, other endocrine disturbances without hypothyroidism (total of 89.4 with endocrine disturbances coexistent with root resorption); 10.6, other systemic diseases. (3) Root-end resorption following orthodontic treatment was more severe than without previous orthodontic treatment, which seems to indicate that the mechanical factor accelerates the resorptive process. (4) Root-end resorption is most frequently found with osteoporotic and osteodystrophic changes of the paradentium. (5) Early detection of endocrine unbalance or constitutional defect is not only im-

portant for prevention of orthodontic failures, but also for prevention of paradentosis, because the latter often develops later in life on the same basis, i.e., osteoporotic and dystrophic changes in paradentium.

39. CEMENTOMA: EMPHASIS ON ROENTGENOGRAPHIC EVIDENCE. *Edward C. Stafne, D.D.S., Section on Dental Surgery, Mayo Clinic, Rochester, Minn.* Cementoma in man is not as uncommon as formerly supposed; roentgenographic examination of 10,000 consecutive adults revealed 24 cases. Incidence, therefore, is at least 2.4 per 1000. In 65 cases, including 35 previously reported by me, 130 teeth were involved: mandibular, 123; maxillary, 7—a ratio of more than 17 to 1; 106 (81 percent) were mandibular incisors. Tests indicated that all, excepting two, were vital. Of patients, 70 percent were females. Physical examination suggested no association of cementoma with any one disease. Three roentgenographic phases, typical as indicating stages of development, have been correlated with the microscopic appearance in enough cases to establish dependability of the roentgenographic picture: (1) In the early stage, a radiolucent image is cast, and mistaken diagnoses of periapical infection or radicular cyst are often made. (2) The second typical picture, seen when sufficient cementum has formed to produce a radiopaque image in the central portion of the original radiolucent area, often causes diagnosis of calcified granuloma. (3) In the third typical picture, a narrow, fairly even band of radiolucence immediately surrounds the radiopaque area, which at this stage almost completely fills the radiolucent area; this radiolucent band alone distinguishes cementomas from osteosclerosis. Cementomas are significant only insofar as they occasion misinterpretations.

40. HARDNESS STUDY OF TRANSFORMATIONS IN GOLD-COPPER ALLOYS. *Harry H. Asher, D.D.S., M.S., Dental School, University of Illinois, Chicago, Ill.* Alloys of gold with copper were studied in regard to possible utilization of the CuAu transformation. Hardness tests were made with Shore's Monotron Hardness Indicator on castings of these alloys in quenched and slowly-cooled states. The result differs from that of Kurnakow, Zemczuzny and Zasedatelev, but resembles those of Haughton and Payne, and Kurnakow and Ageew. Differences are probably due to segregation, as demonstrated by photomicrographs. A new area belonging to a compound $CuAu_3$, similar

to the area containing the compound Cu_3Au, was studied. However, the author believes that these transformations are not due to compound formation, and that the gold-copper system is an unbroken series of solid solutions with one major and two minor lattice changes, affected in various degrees by heat-treatments.

VII. Sixth Session: Evening, March 18; Abstracts 41–47

41. American Association of Dental Schools. *W. F. Lasby, B.S., D.D.S., F.A.C.D., School of Dentistry, University of Minnesota; President of the American Association of Dental Schools.* The speaker brought the greetings of the American Association of Dental Schools, the meeting of which (March 19–21) the members of the Research Association were invited to attend, especially to hear the final report of the important research of the Committee on the Survey of the Dental Curriculum, in progress since 1930 (see abstract 44). Calling attention to the mutual interest of the School Association and the Research Association in both teaching and research, the speaker said in part: The young profession of dentistry does not yet have in its colleges a sufficient number of instructors with a background of scholastic attainments, teaching, and research achievement. Demonstrators and clinicians far outnumber those having earned degrees in science or the arts. No organization in dentistry is so stimulating as this Association in the attempt to develop a desire on the part of teachers to reach out into the fields of the unknown. When we observe the rapid progress in the application of the arts and sciences in other fields, we are confronted by the challenge: Is dentistry keeping up with the progress in other branches of human knowledge? We hope it is. Our personnel of research workers of the real scholarly type is very limited. A larger group is needed. Promising young men must be sought out and encouraged to engage in dental research. There is urgent need for a larger personnel of able teachers and research workers whose work will keep dentistry as a profession well abreast with the times. With this we need a coöperative and not a competitive effort in research. The institution having the best fitted person to undertake a particular problem, and also having the place and needed equipment, should be allowed the privilege or should be chosen as the one to carry on the problem. Useless and wasteful duplication in other

places should be avoided. There is plenty to do for all, even if we practice conservation in that respect.

42. COUNCIL ON DENTAL THERAPEUTICS. *Arno B. Luckhardt, Ph.D., M.D., F.A.C.D., LL.D., University of Chicago, Chicago, Ill., Member of the Council on Dental Therapeutics, American Dental Association.* The author, making it perfectly plain that he spoke as a member of, and not *for*, the "Council," dwelt briefly on the personnel and aims of the Council. Its accomplishments were discussed under the heads of (a) *destructive criticism*, dealing particularly with the dentifrice racket; (b) *constructive work*, in the form of "Accepted Dental Remedies" now ready for publication in book form; and (c) *research* on products submitted for acceptance. He pointed out impediments to the Council's activities, stating that "many editors of journals of organized dentistry were, and still are, either lukewarm or passive in the matter [Council's work]; one editor in particular has been, on occasion, even actively hostile." The author asked for ample financial support for the Council, and for the Bureau of Chemistry of the American Dental Association; and expressed the hope that the journals of organized dentistry would reject advertising of products declared unacceptable by the Council, and that no products so declared would be given floor space at official meetings and conventions. In conclusion, he urged active editorial support, together with constructive criticism, by those in charge of official dental publications; and pointed out the active and unsolicited support the Council is receiving from members of the dental profession, deans and faculties of medical schools, and the U. S. Government. (To be published in *J. Amer. Den. Assoc.*)

43. COMMITTEE FOR DENTAL HEALTH SURVEY OF THE AMERICAN DENTAL ASSOCIATION. *C. T. Messner, D.D.S., F.A.C.D., Chairman, U. S. Public Health Service, Washington, D. C. Survey of facilities:* the U. S. Public Health Service has *completed* the survey of dental activities in departments of health, education, and welfare, and in institutions, in 20 states. It is hoped that this phase can be completed by August 1, 1934. This does not include survey of city or county units, which will not be started until the state survey is completed. *Survey of dental needs:* 23 states are making dental examinations. Of this number, Indiana, Minnesota, New Jersey, and Tennessee are

examining practically all grade-school children. All other states of this group are examining from 10 to 50 percent of the grade-school population. The number of examination blanks already sent to 25 states ranged from 600 in Montana to 631,500 in Tennessee—a total of 3,318,111. A number of states, in sections of the country where adjoining states with similar classes of people are already functioning, have recently volunteered to make the survey. Owing to the high cost of tabulating the data, and to the fact that additional examinations in their localities will be unnecessary for an accurate cross-section, these states have been requested not to make the survey.

44. COMMITTEE ON SURVEY OF THE DENTAL CURRICULUM. *L. E. Blauch, Ph.D., Executive Secretary, Curriculum Survey Committee, American Association of Dental Schools, Chicago, Ill.* The survey of the dental curriculum is a practical application of scientific methods of research as developed by students of education. It is an attempt to determine what constitutes an adequate training for the general practice of dentistry. An effort was made to obtain a comprehensive view of the requirements of dental health-service, and on this basis to determine what should be taught to undergraduate dental students, and to arrange this subject matter and experience in a curriculum to be recommended to the American Association of Dental Schools. Every effort has been made to conduct the survey according to well established principles of curriculum construction. (Preliminary account: *J. Amer. Coll. Dent.*, 1934, *1*, 41; April.)

45. DENTAL RESEARCH AT THE NATIONAL BUREAU OF STANDARDS. *Wilmer Souder, Ph.D., F.A.C.D., National Bureau of Standards, Washington, D. C.* This research was inaugurated in 1919 to enable the Bureau of Standards to advise the Government in selecting and purchasing high-quality dental restorative materials. The work was begun in typical standardization manner, and during the first three years was confined to dental-amalgam alloys. We sought an outline of physical and chemical properties essential for satisfactory amalgam alloy. Test methods giving approximate values had been described by a few investigators. As our studies progressed it soon became evident that greater accuracy of test data was necessary for proper rating of these materials. We had to design more accurate testing methods. This necessity was supplied by adapting the interferometer to measure

length-changes, by selecting accurate micrometers to measure flow, and by modifying shapes and sizes of test specimens to conform to approved dimensions. For gold alloys and accessory materials it was necessary to introduce a new vocabulary and an entirely new interpretation of physical properties. Such descriptive words as karat, color, fineness, brittleness, etc., strongly suggesting a jewelry atmosphere or influence, were modified, or supplanted, by simpler terms and values giving exact percentages of precious metal, definite tensile strengths, elongations, casting shrinkages, compensation, fusion points, etc. This directed the dentist's attention to metallurgical, engineering, and mechanical properties rather than to the indefinite qualities so often emphasized by jewelry organizations. Sketchy data and test methods were available on many physical properties, but it was not possible to organize and interpret the findings into a coherent whole. We set up an entirely new procedure, including new and accurate methods of chemical analysis, determinations of shrinkages, and engineering properties.

This change in emphasis came as a shock or surprise to the dentist, but it directed his thinking to more accurate description and understanding of fundamentals of theory and practice in dental operative science. Authors of recent dental text-books have given excellent service in assisting dental students, instructors, and practitioners to make this transition to the new vocabulary and to a new understanding of the theme of this phase of their art. Manifestly this change of emphasis to a different set of properties, which are now accepted as of major importance, had to be supplemented by proper quantitative numerical values to make it possible for each member of the profession to secure materials of unquestioned merit. These numerical values do not happen to be an assemblage of superlatives. The best gold alloy for a partial denture restoration, for example, does not require maximum possible percentage of precious metal, hardest surface, strongest tensile property, and highest fusion point combined in one alloy. There must be selection of each value after proper consideration of its relations to associated properties. That, in simple language, meant a specification had to be prepared for each dental material coming under our study. The art required in preparing a satisfactory specification is not inferior to the art of producing satisfactory dental

restorations. The two are related. Fortunately we had the coöperation of a large number of dentists who were willing to tell us in simple language what qualities were desired, and what qualities were not desired, in certain materials. By a statistical method we rated these recommendations from the profession, and temporarily set up what could be regarded as the ideal for each material. Ideal qualities are seldom available, and if made available are usually excessive in cost. This was true here. Definite variations or tolerances are necessary in manufacturing and marketing operations. Limits to cover these requirements were established through conferences with manufacturers and extensive tests of products on the market. With establishment of these limits, specifications were cast and manufacturers permitted to guarantee, on their own responsibility, their products to be equal to the specification for the respective product.

Another contribution from this research has been the interpretation of data in terms of dental practice. During the last five years this phase of the work has been increased. We have attempted to explain, to the dentist, effects of his technics as they relate to finished operations. Dentists are thus aided in understanding many difficulties in the effort to render high quality professional service. Theoretically this develops into an ideal arrangement. The *proper qualities* are specified in definite values. The *competent manufacturer* can supply material, and guarantee it to be up to standard. The *unscrupulous manufacturer* dares not guarantee his product as up to standard, and therefore may not compete for this business. The *dentist* is assured of receiving the best product, and extensive instructions regarding proper manipulative procedure in making restorations. The *public* may expect to receive the best restorations it is possible to produce through the highest advancement of dental science and dental art. This *ideal arrangement* is being realized to a remarkable degree. *Other materials* remain for study and standardization. The efficiency of the standards must be maintained. The *success of the program* to date gives us confidence that no obstacles will be placed in our path as we continue to establish and maintain standards for these items that serve as guardians of the oral and often general well-being of our citizens.

Attempts to evaluate this work on a financial basis are very difficult.

The savings to the public through more efficient dental service, thus eliminating added costs of periodic replacements that so frequently resulted previously from use of defective materials or defective technics, have been variously estimated at $1,000,000 annually for the United States alone. This does not mean less work for the dentist. Increased confidence in the ability of the dentist to truly restore, and more nearly to attain permanency in restorations, causes the public to ask for more extensive service.

The author acknowledges, with gratitude, the coöperation of the Weinstein Laboratories, and of the Research Commission of the American Dental Association, which have made it possible to conduct this research at a more rapid rate than would have been possible through the use of Federal funds alone; also, with highest appreciation, the work of research associates, among them R. L. Coleman, N. O. Taylor, G. C. Paffenbarger, W. T. Sweeney, W. H. Swanger, and Bureau of Standards associates, Aaron Isaacs, Chauncey Peters, and Peter Hidnert. These associates have performed most of the laboratory work, and have made extensive contributions to the constant development of the program.

46. President's Address—Louis-Charles Malassez: 1842–1909. *Edward H. Hatton, B.L., M.D., Northwestern University Dental School, Chicago, Ill.* Published in full as section I (pages 154–157).

47. Acceptance of the Presidency of the International Association for Dental Research, for 1934–35. *J. L. T. Appleton, Jr., B.S., D.D.S., Dental School, University of Pennsylvania, Philadelphia, Pa.* No manuscript received for publication.

VIII. Papers Read by Title: Abstracts 48–111

A. Contributions by the Vienna Section: Abstracts 48–61

48. Epithelial Rests in Region of Palatinal Papilla of Upper Jaw. *Richard Grohs, M.D., Histological Laboratory (Director Dr. B. Gottlieb), Dental Institute (Director Prof. Dr. H. Pichler), University of Vienna, Vienna, Austria.* In the region of the palatinal papilla there are remnants of epithelium from processes of the secondary palate and primitive palate, which unite during embryonic life. In adults, epithelial rests of this kind occasionally occur in the papilla

and palatal raphe. Such rests are of practical interest to the dentist because in this region they may develop inflammatory processes as well as cysts. The main epithelial rest in this region is the ductus naso-palatinus, which may have a nasal part, an oral part, and occasionally a middle part. In one case a continuous ductus naso-palatinus was observed, connecting nasal and oral cavities. Mucous glands often enter these ducts. When the opening toward the mouth is closed, and glands produce mucus that cannot be eliminated, a retention cyst may develop. Other epithelial rests in this region may also lead to cyst formation.

49. Modification of Cyst Operation according to Partsch. *Otto Hofer, M.D., Jaw Department (Director Prof. Dr. H. Pichler), First Surgical Clinic (Director Prof. Dr. A. Eiselsberg), University of Vienna, Vienna, Austria.* Large cysts are generally operated according to the conservative method of Partsch to preserve a part of the cystic membrane. To improve after-treatment, one has to consider, during the operation, that the orifice into the cystic space should be epithelized as well as possible after the operation. This is accomplished by sewing up the edge of the mucous membrane with the cystic membrane. It may happen that because of inflammations the cystic membrane is so fragile that it tears at every attempt to make the seam. In such cases it is advisable to epithelize the cystic mouth with a Thiersch flap, as follows: after having widely opened the cyst, a mold is taken of the hollow space and the mouth with stentsmass. According to the surface of the wound on the mouth, Thiersch flaps from arm or leg are pasted on the mold, which is again introduced into the cystic space, where it is kept in proper position by pressure of the cheeks alone. The mold is removed after six days. In nearly all cases, Thiersch flaps heal on the wound surface, and continuity of the epithelium between oral and cystic cavity is again restored.

50. Club-Shaped Processes of Odontoblasts in Cementum. *Ernst Kellner, M.D., Histological Laboratory (Director Dr. B. Gottlieb), Dental Institute (Director Prof. Dr. H. Pichler), University of Vienna, Vienna, Austria.* Spindleshaped formations are sometimes seen in cementum of dog jaws, sectioned and stained by Schmorl's method (thioninpicric acid). These formations seem to be processes of odontoblasts entering the cementum (*fig. 3*, S). They generally appear on

the dento-cemental junction in primary cementum; sometimes one or more occur in secondary cementum overlapping primary cementum. Their form is pear-like, with nibs turned toward the cementum surface; sometimes they have two points. They occur singly, in groups, or in continuous series side by side; not in every jaw, and were found only at molars. They are not homogeneous, but have a grained structure. Spindles in enamel have been described heretofore, but these have a bag-like and more oblong shape. Delicate ends of branches of odontoblasts are also seen in cementum, but less frequently.

51. Metaplastic Changes in Pulp Due to Large Doses of Paraformaldehyd. *B. Orban, M.D., Histological Laboratory (Director, Dr. B. Gottlieb), Dental Institute (Director Prof. Dr. H. Pichler), University of Vienna, Vienna, Austria.* In my paper last year (p. 215) I demonstrated that if a small proportion of paraformaldehyd is mixed with zinc oxide and temporarily applied in a tooth cavity, secondary dentin is produced in the pulp, without injury to the latter. When a large percentage of paraformaldehyd is applied in a healthy tooth, metaplasia of pulp-tissue may occur. *Fig. 4* shows a dog molar into a cavity of which zinc oxide-paraformaldehyd mixture, containing 25 percent of the latter, had been placed. Three months later, when the tooth was subjected to histological examination, the pulp had changed its embryonic character and showed fibrous connective-tissue; in the middle, bone tissue had developed. In a higher magnification (*fig. 5*), normal bone with osteoblastic cells and nutrition-channels can be seen. *Fig. 6* shows the pulp chamber of a dog tooth in a cavity of which, for only one day, zinc oxide-paraformaldehyd mixture (20 percent of the latter) had been deposited. The lower part of the pulp-chamber contains a thick layer of secondary dentin; odontoblasts are normal. In the upper part, bone has been produced instead of secondary dentin; the odontoblasts are changed in the osteoblasts, and the pulp shows characteristics of fibrous connective-tissue in which there is a free deposit of bone. *Fig. 7* shows the borderline between secondary dentin in the lower part, and bone in the upper. The pulp in the root-part shows a normal odontoblastic layer and normal pulp-tissue without any sign of inflammation. My experiments show that low concentrations of paraformaldehyd can be used

to advantage to obtain anesthesia of pulp as well as production of secondary dentin; they also show that large percentages of paraformaldehyd may cause metaplasia of the pulp and thus endanger the tooth.

52. Basal-cell Cancer in a Large Dental Cyst. *H. Pichler, M.D., Dental Institute, University of Vienna, Vienna, Austria.* Carcinoma in the depth of alveolar process is likely to originate from epithelial rests of Malassez, these being the only epithelial cells that occur in this place. It is astonishing, therefore, that cancer of the jaw can only very rarely be traced to a dental cyst, the epithelium of which has the same origin. I remember one case described by Partsch. At first my case seemed to offer the same simple explanation. Operating upon a woman, aged 48, I opened in the upper jaw a large cyst lined with smooth epithelium. On close inspection, a small prominent area was found in its mesial and nasal corner in which the wall was formed by a thick cushion of extremely soft tissue very suggestive of malignancy. Microscopic examination revealed a basal-cell cancer (*figs. 8* and *9*): papillae built up from very loose connective tissue—edematous in some places, hyaline in others—covered by undifferentiated epithelium showing many atypical cells and mitoses. Compared with normal nasal mucous membrane (*fig. 10*), taken from the neighborhood of the growth, there is undoubtedly a certain likeness. Therefore, I believe this cancer originated in the nose, and grew through the wall of the cyst without any etiological relation thereto. The cyst was but a lucky circumstance that led to very early diagnosis and operation of the cancer, which otherwise would have grown a long way before being detected. (*Zeit. f. Stom.*, 1932, *30*, 843.)

53. Spontaneous Healing of a Large Mandibular Tumor. *H. Pichler, M.D., Dental Institute, University of Vienna, Vienna, Austria.* In 1911 I examined a woman, 29 years old, who came to the Eiselsberg Clinic for treatment of a growth in the left side of the mandible (*figs. 11* and *12*). Nine months previously she suffered from severe pains, which were relieved by extraction of a left lower molar. A swelling remained and had rapidly increased during the last three weeks before admission. It was painless, soft, fluctuating with slight pulsation, and yielded bloody liquid on puncture with a syringe. An operation was about to be performed, when the patient suddenly left the Clinic because of serious illness of her husband. She remained

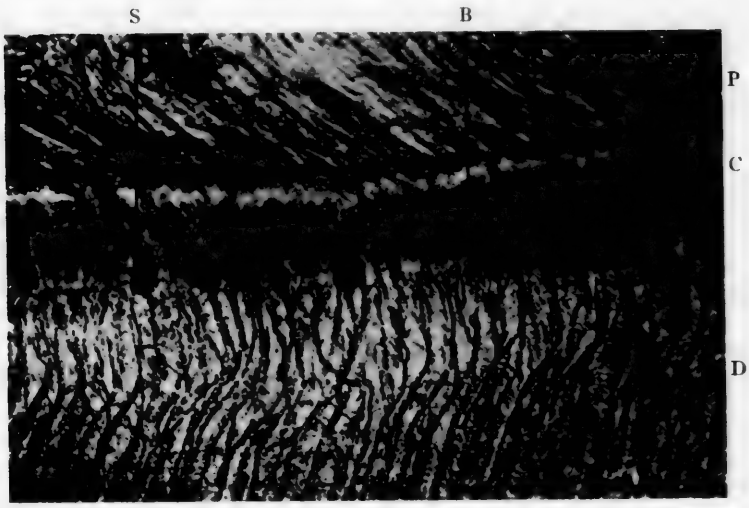

FIG. 3. Section of part of molar. *B*, junction between dentin and cementum. *C*, cementum. *D*, dentin. *P*, periodontal membrane. *S*, spindle-shaped processes in cementum.

FIG. 4. Treatment with zinc-oxide-paraformaldehyd (25 percent of latter) for three months. *C*, cavity. *B*, bone in pulp.

FIG. 5. Higher magnification of portion of *fig. 4*, showing bone in pulp

FIG. 6. Dog tooth with cavity, *C*, in which zinc-oxide-paraformaldehyd (20 percent of latter) was sealed for one day. Filling then replaced with common cement; dog lived four months. Secondary dentin, *SD*, deposited in lower part of pulp; in upper part, bone, *B*. *D*, primary dentin.

FIG. 7. Higher magnification of portion of *fig. 6*. Borderline between secondary dentin, *SD*, and bone, *B*. *NP*, normal pulp. *FP*, fibrous pulp, *D*, primary dentin.

FIG. 8. Section of cystic epithelium; from mesial and nasal corner. Basal-cell cancer: papillae built up from very loose connective tissue; edematous in some places, hyaline in others; covered by undifferentiated epithelium showing many atypical cells and mitoses.

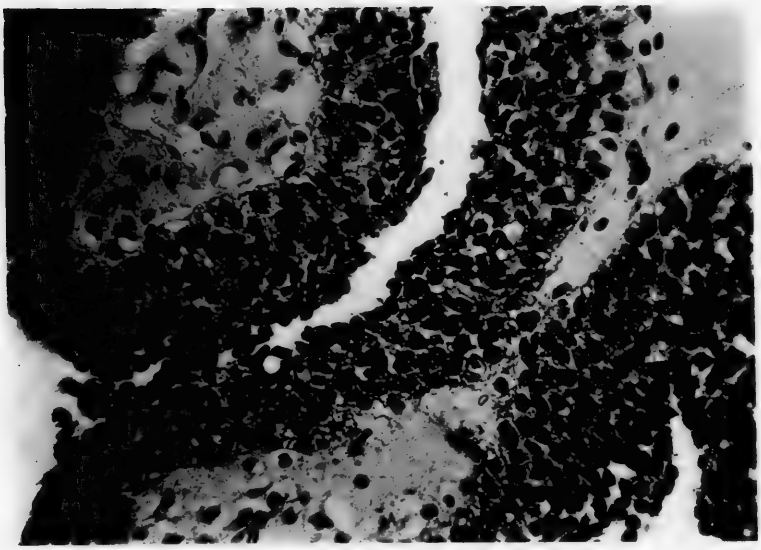

FIG. 9. Legend for *fig. 8* applies also to this section

FIG. 10. Section of normal nasal membrane; from neighborhood of growth (*figs. 8* and *9*).

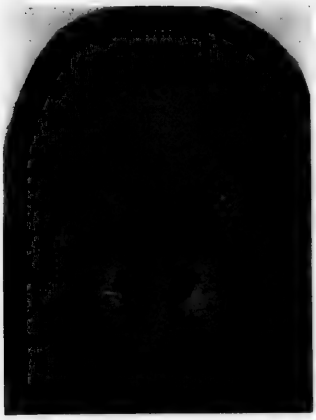

FIG. 11

FIG. 12

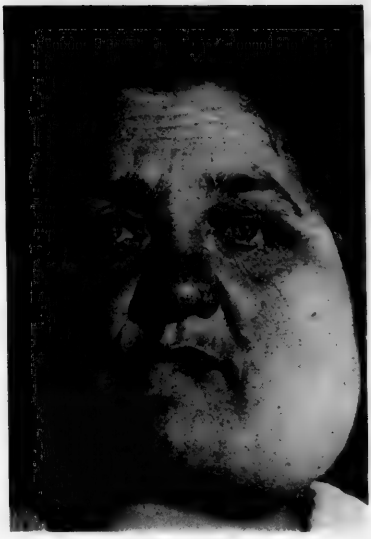

FIG. 13

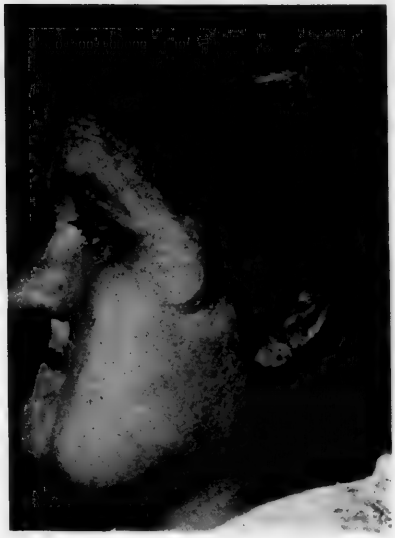

FIG. 14

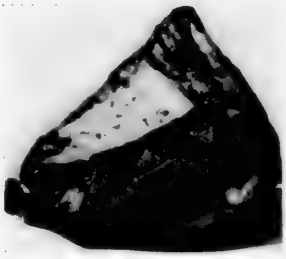

FIG. 15

FIG. 16

FIG. 11. Photograph of patient at first examination; 1911.

FIG. 12. Radiograph of lower jaw in 1911. Shadow of cavity in bone more dense than in common cyst.

FIGS. 13 AND 14. Photographs of patient 21 years later; Dec. 1932.

FIG. 15. Piece of bone removed by operation.

FIG. 16. Radiograph a week after operation.

FIG. 17

FIG. 18

FIG. 19a

FIG. 19b

FIG. 20

FIG. 21

FIG. 17. Starting model of case of Kennedy Class I; 7 5 1 5 6 7 to be replaced.

FIG. 18. Model with finished denture. *a*, Continuous clasp. *b*, Support pieces. *c*, Stiffening bow. Lateral appendages, fixed on plugs, catch in rubber behind prevaulting and prevent distal excursions of denture.

FIG. 19. Side views of model in *fig. 18*. *a*, Right; double clasp on 5, 4. *b*, Left.

FIG. 20. Denture in *fig. 18*, removed from model. Clasp trestle and denture separated. On denture: beds for plugs.

FIG. 21. Case of diffuse atrophy.

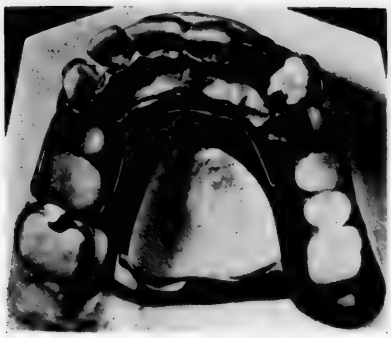

FIG. 22a

FIG. 22b

FIG. 23

FIG. 24a

FIG. 24b

FIG. 22. Case in *fig. 21* with finished denture. Frame, connecting clasps from $\underline{3}$ and $\underline{7}$, turned over teeth of denture, and rests upon rubber. Lateral mobility of denture permitted by adjustment in rubber (*fig. 23*). Absent $\underline{2}$ to be fastened on clasp trestle; on denture would cause undesirable shape, and risk fracture of natural tooth.

FIG. 23. Frontal section through denture in *fig. 22*, in sphere of trestle frame, region of $\underline{6}$. Frame posed on rubber fixes denture. Adjustment in rubber, within frame, accommodates for lateral chewing movements without moving trestle frame.

FIG. 24. Lower one-side denture. Closed plate of gold as clasp trestle, instead of frame trestle consisting of continuous clasp and stiffening bow.

FIG. 25a FIG. 25b

FIG. 25. Upper one-side denture. As in *fig. 24*, slender closed plate of gold instead of frame trestle; $\underline{3}$ drawn into frame trestle, to avoid unfavorable shape and danger of fracturing natural tooth.

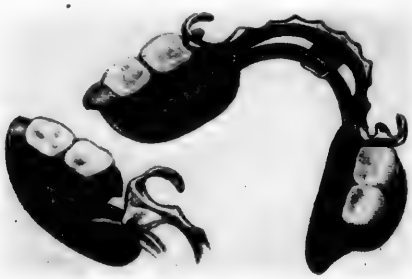

FIG. 26. Under bow-piece. Clasp trestle consists of continuous clasp, bearing appendages for fixation of denture. Splints at end of clasp trestle prevent dismounting of trestle and denture in mouth.

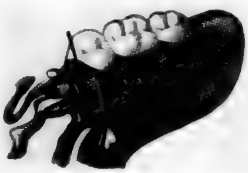

FIG. 27. Independent removal of clasp trestle made impossible by splint soldered to trestle (arrow); geared into cavity large enough for desired mobility.

away 21 years, returning in Dec., 1932 (*figs. 13* and *14*). Meanwhile she gave birth to ten children (eight of whom are living, in good health), and the swelling kept growing slowly—12 years ago it became very painful, burst, and discharged much blood into the mouth. Similar events recurred four or five times. At last the opening became permanent, the ensuing cavity being big enough to admit two or three fingers, and was somewhat troublesome because of retention of food. But there were no more pains and the patient otherwise felt well. The enlarged mandible was hard, painless to touch, quite free in its motions, edentulous excepting two loose incisors on the right side. In the mouth an opening the size of an ordinary egg led into a large cavity within the bone, lined with mucous membrane that was apparently normal. Surrounding bone was greatly thickened, irregular in structure, and apparently very dense. Unfortunately we know nothing definite about the nature of the original growth. It might have been a common dental cyst with hemorrhage into the cavity, or a benignant tumor; but its bloody content, and discharge of blood at the moment of perforation, suggest that it was an "osteodystrophia fibrosa localisata," i.e., a benignant giant-cell tumor.

Progressive growth had ceased, and pathologic tissue or other content of the bone cavity seemed to have disappeared on perforation and with establishment of a permanent opening, just as growth of a cyst is stopped and its content disappears on establishment of a large permanent opening by a Partsch operation. I considered the surrounding hyperostosis a secondary feature of the process, similar to the irregular formations of bone that sometimes occur in certain chronic forms of osteomyelitis, or in rare instances around dental cysts. The pathologic condition of the surrounding bone probably prevented the cavity from becoming filled with newly formed bone as would have been the case, for instance, after a Partsch operation of a cyst. To eliminate the troublesome cavity in the mouth and the disfigurement, I removed the outer wall of the bone cavity. The operation was difficult and tiresome because of the great hardness and bulk of bone to be cut away. It was complicated by a fracture of the inner wall of the cavity. This fracture was wired and healed readily without dislocation. *Fig. 15* shows the piece of bone removed; *fig. 16*, x-ray photograph after operation. The result was satisfactory. Micro-

scopic examination of the bone and "mucous-membrane" lining did not reveal any specific conditions—no indication of osteodystrophia fibrosa, adamantinoma, or Paget's disease. (*Zeit. f. Stom.*, 1933, *31*, 217.)

54. New Kind of Clasp Fixation for Partial Dentures: Method for Better Protection of Clasp-teeth against Loosening, with Simultaneous Splinting Effect. *Georg Stein, M.D., Histological Laboratory (Director Dr. B. Gottlieb), Dental Institute (Director Prof. Dr. H. Pichler), University of Vienna, Vienna, Austria.* I have tried, by complete separation of clasp and denture, to avoid some disadvantages of current appliances. The principle of my device is this: by a gold trestle combined with clasps, the denture is retained in position, and splinting of the teeth is attained. When use causes mucous membrane to relax, resorption of alveolar bone results, and some settling occurs; the denture is then lifted from the trestle and the clasp-teeth do not take the load. Also in lateral movements, in chewing, clasp-teeth are spared. The accompanying illustrations and legends show the principal features of the construction and some practical results (*figs. 17–27*). A trestle (*fig. 18*) is posed on existing teeth by clasps that serve as a splint for the teeth. The supporting pieces hold the denture in position. During mastication, the denture leaves the trestle but the clasp-teeth are unmoved. When the denture settles, and contact between supporting pieces and denture is impaired, the supporting pieces are sawed from the trestle, the rest of the trestle and denture are returned to the mouth, and a plaster cast is taken. In the model, the pieces in correct position are again soldered to the trestle. The denture can be made after taking only one cast. If made of metal, it is finished, brought upon the model, and then the trestle is constructed. If made of rubber, however, the trestle is first constructed, placed upon the model, and then the rubber piece vulcanized. In this procedure, separation of denture and trestle may be difficult; careful warming of the trestle facilitates dismounting. The trestle may be made in conformity with the Unitor mold-procedure, or by soldering together the separate parts (continuous clasps, stiffening bow, support pieces, clasp arms). *Fig. 27* shows an arrangement to eliminate danger of swallowing the trestle; for which reason, also, the constructions should not be too small.

55. TREATMENT OF DECIDUOUS TEETH WITH REFERENCE TO FOCAL INFECTION. *Georg Stein, M.D., Histological Laboratory (Director Dr. B. Gottlieb), Dental Institute (Director Prof. Dr. H. Pichler), University of Vienna, Vienna, Austria.* Pulpless deciduous teeth are dangerous not only because of attendant chronic periapical inflammation, but also because exposed pulps provide a port of entry for pathogenic organisms. For these reasons deciduous teeth with diseased pulps should be treated, as they may be successfully, although this is more difficult and uncertain than for permanent teeth; or they should be extracted, and a space retainer inserted. Special effort should be made to preserve the second deciduous molars because they are important for the adjustment of successors. Adequate treatment may include use (a) of a gold crown or, after removal of caries, (b) of an orthodontic hoop of German-silver leaf cemented on the tooth, and the occlusal surface filled with amalgam. This treatment preserves the tooth; its chewing function is restored; and contact with adjacent teeth is properly maintained.

56. TREATMENT OF ANGLE'S CLASS II, WITH HERBST'S RETENTION-APPLIANCE. *A. M. Schwarz, M.D., Histological Laboratory (Director Dr. B. Gottlieb), Dental Institute (Director Prof. Dr. H. Pichler), University of Vienna, Vienna, Austria.* In the original description of Herbst's appliance there are some deficiencies that tend to make treatment a failure. Defects in the appliance have nothing to do with the principles of the treatment, which are correct. The outstanding defect in the method is the anchorage of the appliance. The anchorage is too weak; teeth to which the appliance is attached shift, whereas they should be fixed. In the upper jaw, anchor molars drift distally; in the lower, front teeth tip labially. Consequently it is impossible to judge exactly how far the position of the lower jaw really changes its position. The bars of the apparatus also slip off the canules when the patient widely opens his mouth. These defects can be avoided by applying a strong anchorage to include twelve teeth in the upper jaw, twelve in the lower. The apparatus itself has also been modified. In this way about twenty cases have been treated, including patients between 12 and 15. The results have shown that with this appliance success can be attained sooner than with intermaxillary rubber-bands. The treatment takes about six to nine months, without any further work;

the lower jaw as a whole is brought forward as far as possible. In one case, the occlusion of a boy of 14, who used the apparatus for only six months, became normal; he has never worn a retention appliance. One year and a half have passed without any inclination to a relapse. His sister, three years older, had the same anomaly, and at the same age was treated for two years with intermaxillary rubber-bands, though her abnormality was not as great as her brother's. The author concludes that Herbst's apparatus for the treatment of Angle's Class II is equal in value to the method of intermaxillary rubber-bands; in some cases one method, in some the other, can be more usefully applied.

57. INHERITANCE OF ORTHODONTIC ANOMALIES. *Richard Trauner, M.D., Vienna, Austria.* Although Angle has denied the possibility of inheritance of occlusal anomalies, other orthodontists, among them Pont, Rubbrecht, Brash, and Korkhaus, have more recently accepted it. The author has been carefully examining several families from this point of view. If an anomaly is inherited, a well-defined anatomic variation must occur in several relatives, distributed according to Mendelian laws. The picture of the anomaly differs in single cases only by its grade and the signs of related circumstantial influences. For example, in distal occlusion (Angle's Class II), the distal position of the lower jaw is the principal inherited anomaly in all cases in one family; but in some there is protrusion (I div.), in some retrusion, of the upper incisors (II div.) according to the position of teeth and lips. Cases with a larger distal displacement often show frontal protrusion. Such distinctions between inherited and other causes make it possible to clear up the development of each case; to distinguish typical unlike anomalies from one another; and to give a real genetic diagnosis, not only a descriptive anatomical one, from single deviations. In the families studied, the following anomalies were inherited: (a) Mesial and distal deviations of both jaws to one another (Classes II and III: Angle). (b) Mesial and distal deviations of upper and lower teeth to one another, with normal position of the basis of the jaws, including so-called excessive frontal overbite. (c) Want of space in both jaws, with rotation and ectopic position of some teeth ($\frac{3}{3}$) in cases where no deciduous teeth had been extracted too early. (d) High palate, with sharply arched upper row, and narrow face including nose and jaws. Besides the foregoing most important and frequent anomalies,

the following are also inherited: (e) Very broad basis of the jaws, forming a rather large protruding lip around the upper jaw, sometimes with spaces between teeth (opposite of c). (f) Missing or supernumerary teeth, with secondary occlusal anomalies. (g) Malposition of single teeth (inherited retained $\underline{3|3}$, a.o.) and other changes of single tooth germs. (h) Bimaxillary protrusion (Negroes), protrusion of upper front teeth in Class I. Where there is a large amount of inherited variations (recessive inheritance), inaccessible relatives may be affected as well, but cannot be studied. Examination of very many families is necessary to show whether the same or similar anomalies may be caused by external influences.

58. Extension of Occlusal Fillings by Grinding of Fissures. *Richard Trauner, M.D., Vienna, Austria.* Occlusal fillings should be extended beyond the area of actual caries, not to transfer their margins to regions immune to caries, as for approximal fillings, but rather because there are usually several poorly calcified places in deep fissures beside the first carious spot. All these defective fissures must be filled at once, to prevent recurrent caries. Of course, no margin of a filling should lie in narrow clefts, where it could not be perfectly finished. Such extension can be attained by cutting out all fissures within the dentin to their very ends, and filling; but we do just as well by filling only carious or defective pigmented parts, if simultaneously we enlarge adjoining unaffected fissures into broader grooves by grinding within the enamel. The entrance to fissures being very narrow, it is often impossible to decide where, on an intact tooth, the fissures are poorly calcified or already carious at the bottom. But if preparation of an occlusal filling is started by grinding all fissures with a small wheelstone into broader grooves, their bottoms are at once exposed, and fillings are inserted only where they are needed. Everything is open, obvious and clean. Margins of fillings in plain grooves can be polished easily. In cases of early caries in permanent molars of children, excessive excavation in sensitive dentin should be avoided, and work done more rapidly and gently. In distolingual fissures of upper molars it is unnecessary to extend fillings over the crest of the occlusal plane, where it is difficult properly to condense an amalgam filling. At first I ground all fissures prophylactically, as Hyatt recommends. Later I concluded this is impracticable in very deep, narrow, and poorly

calcified fissures. I could not reach the bottom of such very deep fissures, because round burs are not hard enough for enamel, and our stones are not thin enough for very narrow fissures, if they should not break. Therefore, I combine grinding and filling in each case, according to its individuality, having used this method during the past two years at the first sign of caries, and for every other occlusal filling coming under my care. Unlike Brunn, who grinds the whole occlusal plane with a large stone into a very broad groove with buccal and lingual crests, we prefer to follow each fissure with a small wheel-stone 0.5 to 1 mm. thick.

59. Some Methods in Dental Surgery. *Richard Trauner, M.D., Vienna, Austria.* To remove an impacted upper cuspid, I knock it out. The end of the root, cut off from buccal side to lingual, is struck with a mallet, using a suitable plugger. The crown then comes out of the bone. For root-resection, I use local injection of 4 percent novocain, because sometimes there is pain in the granuloma after 2 percent novocain, as for the preparation of a tooth with pulpitis. Inflamed tissues, and tissues having many nerves and blood vessels, seem to need higher concentration of novocain. To cut large pieces of thin bone (over impacted teeth, etc.), I prefer the chisel; but for deeper small holes in thick bone, the bur is better, especially for finding the apex of a lower tooth for its resection. Resection of molars is not essentially more difficult than that of other teeth, if buccal and palatinal roots of upper molars are handled separately, from both sides or one alone. All may be clearly seen as ridges under the bone after removing the soft tissues. Roots of lower molars are as easily found as those of premolars. In both cases it is necessary radiographically to determine exactly the direction of the roots, to avoid going too far mesially or distally, this being the only difficulty. A slight opening of the antrum is of no importance, for it is not kept open artificially with gauze, and the mucous membrane immediately over it is sutured. In widely opening a cyst in the mouth (Partsch op.), not removing it as a whole when teeth are resected, we usually cover resected roots with a flap from mucous membrane of the mouth (Pichler). Because this flap often retracts, I sometimes form a flap out of the cyst membrane to adjust it over these roots. Such a flap is more easily brought to its proper place by attaching it to gingiva with a

suture. Postextractive pain occurs frequently after long chiseling, and when loose pieces of bone have not been removed; also after removal of lower molars, especially third, in the simplest extractions. Therefore, I make the next appointment with such patients on the same day or the following one before severe pains have started. If the socket is empty and has no good coagulum, I insert orthoform after cleansing and drying. Orthoform is formed into stiff sticks with cacaobutter or paraffin, in root-size, so that it may easily be forced into the socket. Above this we pack a piece of gauze. This affords relief so long as no roots or sequestra remain (*Zeit. f. Stom.*, 1934).

60. Proteolytic Ferments in Saliva. *Josef Weinmann, M.D., Histological Laboratory (Director Dr. B. Gottlieb), Dental Institute (Director Prof. Dr. H. Pichler), University of Vienna, Vienna, Austria.* To determine presence of proteolytic ferments, we used fibrin as indicator, comparing quantity of dissolved fibrin with that undissolved. With this qualitative method, we found that much fibrin was digested in saliva. An autolyzing ferment was also found by comparing the quantities of residual nitrogen in saliva, and in portions of it allowed to stand for a day at 37°C. The quantity in the latter was much greater than that in the former, showing that salivary protein was dissolved. It is probable that these findings have some relation to oral diseases. [The author's precautions to exclude the action of bacteria were not stated.—*Ed.*]

61. Chemical Analysis and Bacteriological Investigations of Carbolated Camphor. *Hermann Wolf, M.D., and Fritz Driak, M.D., Dental Institute (Director Prof. Dr. H. Pichler), University of Vienna, Vienna, Austria.* Phenolum crystallisatum is better adapted for fabrication of carbolated camphor than phenolum liquefactum, which contains 9 percent of water. For these investigations camphora vera crystallisata only was taken, although it seems to differ from synthetic camphor only in optical activity. The higher the temperature the more camphor is required for a given amount of phenol. The authors recommend, for practical use in dentistry, a mixture of 1 part of phenolum crystallisatum with *3.3* parts of camphora vera. This mixture, which must be made by warming, can be used at 15°–37°C., because it has an excess of camphor, which may be saturated at higher temperatures. We sought to determine, with hemolytic

streptococcus, whether carbolated camphor thus prepared has stronger bactericidal action than solution of phenolum of higher concentration made with acidum carbolicum liquefactum. Experiments with Staphylococcus and B. coli indicated that the effect of phenolum is multiplied in the contact-layers between carbolated camphor and bacterial cultures. This multiplied effect seems to be essential for successful root-canal treatment. Numerous experiments with animals indicate that carbolated camphor in the contiguous medium is gradually transformed, which condition explains the observed duration of bactericidal effect. The carbolated camphor had no cauterizing or damaging effect on tissues of animals nor of patients. Carbolated camphor should be prepared as follows: warm cautiously 1 part by weight of phenolum crystallisatum on a water-bath; a temperature of 40°–50°C. is enough. To the clear solution, add *3.3* parts by weight of camphor, and warm to about 70°C. to complete the solution. Higher temperatures would cause loss of camphor through vaporization. Carbolated camphor should not be kept in a cold room. Immaterial red or brown discolorations arise in all mixtures of carbolated camphor, owing to oxidations of phenol.

B. Contributions by the Prague Section: Abstracts 62–69

62. Determination of Blood Sugar in Periodontal Disease. *Karl Breuer, M.D., State Dental Institute, Prague, Czechoslovakia.* The author determined amounts of blood sugar by the Hagedorn-Jensen method in 38 cases of *dystrophia diffusa* (nomenclature of F.D.I.); the amounts were normal in all cases. Of 14 cases of *paradentitis profunda simplex*, 13 had normal amounts; 1 had severe diabetes mellitus. Among 24 cases of *paradentitis dystrophicans complicata*, 3 showed amounts higher than normal; 1 had diabetes. Four cases of *atrophia praesenilis* had normal amounts. Of the foregoing 80 cases, only 2 had diabetes. This disagreement with findings of Weinmann (Vienna) is explained by the different nomenclature. There does not seem to be a close connection of dystrophia diffusa with diabetic disturbances of metabolism. Inflammation caused by increased amounts of blood sugar may befall sound paradentium, as well as paradentium suffering from dystrophia diffusa. The author concluded that of 78 non-diabetic cases of periodontal diseases, 76 had normal amounts of blood sugar.

63. Function of the Liver in Cases of Periodontal Disease. *Karl Breuer, M.D., State Dental Institute, Prague, Czechoslovakia.* The hepatic function was examined with levulose in 30 cases of periodontal disease; 19, dystrophia diffusa; 4, paradentitis profunda simplex; 3, paradentitis dystrophicans complicata; 1, atrophia praesenilis. Only one case showed somewhat abnormal values. Three cases of dystrophia diffusa were examined for bilirubin in the blood; all had normal amounts.

64. Basic Metabolism and Specific Dynamic Effect of Protein in Cases of Periodontal Disease. *Karl Breuer, M.D., State Dental Institute, Prague, Czechoslovakia.* Determinations of gas metabolism in periodontal disease, as made by dentists and physicians, cannot be used for comparative purposes. Methods have been different, periodontal diseases have not been defined by an identical nomenclature, and various authors have taken dissimilar values as normal. F.D.I. nomenclature was used. Determinations, in 20 cases, of specific dynamic effects of protein were continued through 3 or 4 hours. In two-thirds, values for basic metabolism were normal. Specific dynamic effects of protein were lower than normal in most cases. Determinations in ten more cases of periodontal disease, by Weinmann's method, confirmed the finding of lowered specific dynamic effect of protein, and so disagreed with Nothmann. The findings do not support the idea that periodontal diseases have characteristic gas metabolism, nor that there are differences of metabolism between different periodontal diseases. (*Zubní Lékařství*, 1933/3, 9, 1934/1; *Zeit. f. Stom.*, 1933/15; *Paradentium: Zahnärztl. Rundschau*, 1933/2.)

65. Prevention of Deposits of Salivary Calculus on Teeth. *V. F. Náprstek, M.D., Prague, Czechoslovakia.* Crystallization points for deposits of salivary calculus are the fixed places nearest openings of salivary ducts: gingival third of lingual surfaces of lower anterior teeth, and buccal surfaces of upper molars. Such surfaces could be protected by placing guards between the gingival margins and the openings of ducts of salivary glands. These guards would receive all deposits and protect gum margins. In cases of indicated prosthetic restoration, whether fixed bridge or partial denture, consideration should be given to this secondary protective function of the bar. As such, it should be laid about 2 mm. below the free margin of the gum.

66. Interesting Case in Etiology of Paradentitis. *V. F. Náprstek, M.D., Prague, Czechoslovakia.* Dysfunction and even entire afunction of genital glands is a serious factor in the etiology of paradental disease. Effective substitutive therapy, beside local therapeutic treatment, may lead to subjective and objective improvements of the disease. There is, however, no great chance for complete and lasting reparation of disturbing changes in the tissue. Prognostically, this success is certainly dependent upon duration of substitutive therapy. It is highly probable that more lasting results would be attained by implantation of homogenic or, at least, homoiogenic material.

67. Biologic Treatment of Dental Pulp. *František Neuwirth, M.D., Surgical Department, State Dental Institute, Prague, Czechoslovakia.* In the author's "biologic treatment," pulp is exposed aseptically, the opening sealed with aseptic dentin, the latter covered with sterile gold-foil without pressure, and the cavity filled with oxyphosphate cement. Pulp possesses high reparative powers, which facilitate conservation of its vitality when adequate treatment is applied. Biologic treatment, by which root canals are closed with living hard tissues, is very promising. With its aid, vitality of many teeth, which otherwise must be devitalized, can certainly be conserved. It is especially valuable for teeth having exposed, non-infected pulps; and is also promising for some inflamed juvenile pulps. It cannot be used generally for treatment of pulpitis, where results depend upon several factors that are dissimilar in different cases. Virulence and extension of infection, local and general resistance, and anatomic conditions, hinder uniform use of any method of pu p treatment. (*Zubní lékářství*, 1928; *Zeit. f. Stom.*, 1933, *31*, 291.)

68. Articulation of the Temporo-mandibular Joint. *Čestimír Parma, M.D., X-ray Department, State Dental Institute, Prague, Czechoslovakia.* With his method of taking close radiographs of the temporo-mandibular joint, the author examined movements of the condyles in different phases of articulation. There are only very small movements during normal articulation. Only wide opening or extensive movement of the jaw requires such positions of the condyles as involve the temporo-mandibular joint. In phylogenetic studies and anthropometric measurements of 200 skulls, he found that the curved form of the mandible results from regression of the facial skull. The

connection of these facts with the curve of Spee, and articulation of teeth, is explained in the paper. (*Zubní Lékářství*, 1931, *11*; 1932, *10*.)

69. FREQUENCY OF ORAL SIGNS OF DEGENERATION IN PSYCHOPATHIC AND NEUROPATHIC PERSONS. *Ferdinand Škaloud, M.U.D., R.N.D.,*

TABLE 2

Frequency of oral stigmata of degeneration in psychopathic and neuropathic persons

First Part[1]

CONDITION	OPEN-BITE		CLASS II, ANGLE		PROGENIA MANDIBULARIS		DEEP OVER-BITE		PROTRUSIO OS. INCIS.	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Debilitas	42	31.50	34	25.37	29	21.64	8	5.97	9	6.72
Imbecilitas	24	29.27	14	17.08	23	28.05	5	6.10	4	4.88
Idiocy	41	68.33	6	10.00	11	18.33	..	...	..	...
Psychopathic constitution	4	4.49	21	23.56	22	24.72	18	20.22	11	12.36
Neuropathic constitution	4	2.96	40	29.63	32	23.71	20	14.81	14	10.37
Total	115	23.00	115	23.00	117	23.40	51	10.20	38	7.60

Second Part

CONDITION	ENAMEL HYPOPLASIA		MACRODONCY		MICRODONCY		MACROGLOSSIA		TOTAL	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Debilitas	8	5.97	..	...	1	0.75	3	2.23	134	100
Imbecilitas	8	9.76	..	...	3	3.64	1	1.22	82	100
Idiocy	..	...	..	...	..	...	2	3.34	60	100
Psychopathic constitution	8	8.99	2	2.25	2	2.25	1	1.12	89	100
Neuropathic constitution	14	10.37	4	2.96	4	2.96	3	2.23	135	100
Total	38	7.80	6	0.12	10	0.20	10	0.20	500	100

[1] Divided into two parts arbitrarily for convenience in printing.

Prof. Dr. J. Jesensky's Dental Clinic, Charles University, Prague, Czechoslovakia. The author found, while somatically investigating 1350 mentally unsound children, that 500 (38.46 percent) had the following anomalies of jaws and teeth: open-bite, so-called Class II Angle (compression of upper jaw, protrusion of front-teeth and hypoplasia

of lower jaw), progenia mandibularis, protrusio ossis incisivi, deep overbite, and anomalies of teeth—hypoplasia of enamel, macrodoncy, microdoncy and macroglossia. All irregularities were correlated with three most important forms of intelligence defect (oligophrenia): debilitas, imbecilitas, and idiocy; also with changes of character, i.e., psychopathic and neuropathic constitutions, e.g., disposition for neurasthenic difficulties. The results are given in *table 2*. Open-bite occurred very often in oligophrenia and in 68.33 percent of cases of idiocy. Greatest frequency of Angle's Class II occurred in cases of "neuropathic constitution;" lowest, in idiocy. Progenia mandibularis has a fairly uniform frequency in these cases, although least in idiocy. Deep overbite, and protrusio ossis incisivi are most frequent in psychopathic and neuropathic constitutions.

C. Contributions by Other Members of the Association, and by Guests, Who Could Not Be Present: Abstracts 70–111

70. Further Dental and Dietary Studies of Aborigines of the Tibetan Borderland—Chiang, Jia-rong, and Hsi-Fan Tribes. *R. G. Agnew, B.A., D.D.S., F.I.C.D., and Mary C. Agnew, M.A., Medical and Dental Schools, West China Union University, Chengtu, Czechwan, China.* No manuscript received for publication.

71. The Maxillary Frenum. *George M. Anderson, D.D.S., F.A.C.D., and Myron S. Aisenberg, D.D.S., F.A.C.D., Baltimore College of Dental Surgery, University of Maryland, Baltimore, Md.* Five fetal maxillae (2, 4, 4.5, 7, and 9 months, respectively) were examined histologically. The frenum fibres did not penetrate the premaxillary suture, but divided equally, right and left sides, joining superficially with fibres of mucosa and periosteum. For a short distance beneath the point of division, a small triangular area of indifferent tissue was found, the function of which is not understood. Each frenum appeared to be fairly normal from the clinical aspect—neither excessively large in size or attachment. Further study of excised enlarged and abnormally attached frenums, from children 7 to 10 years old, showed that the mucosa is lined by stratified squamous epithelium, the basement membrane being folded to form many tall papillae, which contain arterial and venous capillaries, nerve endings, and lymphatics. The connective tissue of the lamina propria is com-

posed of dense white fibres with few elastic fibres. There is no submucous layer; dense fibres of the lamina propria blend with fibres of the periosteum at the bony attachment and with fibres of submucosa of the lips at the labial attachment.

72. Influence of Parathormone on Dentition of Rats on Normal and Deficient Diets. *S. N. Blackberg, Ph.D., and J. D. Berke, D.D.S., Medical School, Columbia University, New York City.* Although rats are comparatively resistant to parathormone, small repeated doses produced distinct effects on teeth and jaw bones. The dental pathology was similar to that in animals whose Ca-P metabolism has been disturbed by other means, such as faulty diet and viosterol. Pulpal reactions included engorgement, serious degeneration of odontoblasts, fibrosis, and necrosis. Dentin and enamel were poorly calcified. Diets that altered Ca-P metabolism, augmented pathological manifestations produced by parathormone. In animals on normal diets, the pathology produced by parathormone was most obvious. In diet-deficient groups, dental abnormalities produced by dietary Ca-P unbalance partially masked similar changes produced by parathormone. In these groups, however, although reactions were similar in character, lesions were much more advanced.

73. Changes in Teeth and Jaws of Rats Accompanying Radium Poisoning. *S. N. Blackberg, Ph.D., and F. B. Flinn, Ph.D., School of Medicine, Columbia University, New York City.* Small repeated doses of radium were administered subcutaneously to rats to induce chronic radium poisoning. Group 1 received adequate diet; Group 2, low-Ca high-P diet; Group 3, diet rich in Ca and low in P. Half of each group received subcutaneous injections of radium; the remainder were used as controls. Definite changes, in teeth and jaws of radium-poisoned animals, were made more severe by diets that disturbed Ca-P metabolism.

74. Effect of Vitamins A and D upon pH of Normal Resting Salivas of School Children. *Robert E. Brawley, B.S., D.D.S., School of Medicine and Dentistry, University of Rochester, Rochester, N. Y.* A group of 133 school children, ranging in age from 11 to 17 years (average, 13), were each given six vitamin-concentrate tablets daily for a period of one year (each tablet contained at least 1500 units of vitamin A, and 2450 units of vitamin D). Another group

of 164 school children of similar age were used as controls. The pH of normal resting salivas was determined colorimetrically at the end of six and twelve months. No significant difference between pH values of normal resting salivas of the two groups was noted at the end of either period.

75. Acidity of Citrate Solutions and Action upon Enamel. *Herbert C. Chase, D.M.D., Harvard Dental School, Boston, Mass.* Recently Enright, Friesell and Trescher (1) reported that solutions of simple buffers having acidities as low as pH = 8.0 injure enamel of extracted teeth, provided contact is continued for 7 days or more. Since the stated minimum injurious acidity is considerably lower than that hitherto reported, further observations seemed desirable. With the same technic, and using citric acid adjusted with NaOH to various H-ion concentrations, we observed that solutions as weakly acid as pH 6.4 caused marked whitening of enamel within 24 hours. With lower acidities (pH 7.0 and 8.2), contacts for 15 and 23 days, respectively, were necessary to produce slight loss of luster—first evidence of injury. In agreement with Enright, Friesell, and Trescher, we found that citrate solutions saturated with tricalcium phosphate, and adjusted to pH = 6.0, 7.2 and 8.0, respectively, produced no detectable change in enamel within 60 days; a similar solution (pH $\doteq$ 5) produced marked whitening within 24 hours, but this did not increase during the succeeding 60 days. Some findings indicate that effects of solutions of higher pH which are produced only after long-continued contact may be referable to factors other than pH. The effective buffering power of simple citrate solutions of the higher values for pH is very low. *Reference.*—(1) Enright, Friesell, and Trescher: *J. Den. Res.*, 1932, *12*, 793.

76. Dental Dystrophies Resulting from Dietary Deficiencies during Lactation. *C. D. M. Day, B.D.S., D.M.D., School of Medicine and Dentistry, University of Rochester, Rochester, N. Y.* Extensive experimentation with guinea-pig mothers on scorbutic diets, supplemented with various amounts of antiscorbutic substance, demonstrated need for plentiful supply of vitamin C. Not only did these mothers succumb earlier, but the microscopic tooth picture, with complete or partial deficiency, showed a greater degree of scurvy in the mothers than in the nursing young. During lactation, it was

possible to change at will both pulp and dentin structures of offspring by varying the amount of antiscorbutic in the mother's diet. Microscopic sections were made of jaws and teeth of more than 120 animals; all groups were suitably controlled. Under conditions in lactating guinea pigs that simulated scanty or impoverished milk supply in human mothers, or faulty artificial feeding of infants, these conditions were immediately reflected in the tooth picture. Despite absence in many cases of clinical manifestations of vitamin deficiency, and often with negative autopsy findings, even partial deficiency of vitamins in the diet of nursing mothers was evidenced histologically in teeth of offspring by abnormalities in enamel, dentin, and pulp. Growth curves, radiographs, incisor growth, and ash content of skeletal structures furnished additional evidence of the importance, both to mother and offspring, of vitamins in the mother's diet.

77. Amylolytic Enzyme of Saliva in Relation to Dental Caries. *C. D. M. Day, B.D.S., D.M.D., School of Medicine and Dentistry, University of Rochester, Rochester, N. Y.* Activity of salivary amylase was studied in 14-year children (100) divided into two subgroups of 55 each: (a) most immune, and (b) least immune, of 500 children clinically examined and radiographed. Care was taken to arrive at an accurate caries figure for each mouth. Expressed as a ratio, the average for the two groups was 1:3. The method of determining amylolytic activity was essentially that of Wohlgemuth: the average for "immunes" was 13 percent greater than that for "susceptibles," in the entire group. There was an average difference of 23 percent between the 30 at each extreme of the series. These results suggest a relation between ptyalin index and dental caries; but, as there was considerable individual variation among the members of both groups, the relation is not sufficiently constant to warrant the conclusion that diastatic power of saliva is a *controlling* factor. However, comparison of the class means, and the fact that the coefficient of correlation for the complete group is more than eleven times its probable error, imparts significance to the correlation in this series, and seems to indicate that salivary amylase may play at least a *subordinate* rôle in caries incidence. The amylolytic activity of saliva is wholly unrelated to sex. (To be published in *Dental Cosmos*.)

78. Fat-soluble Vitamins and Dental Caries in Children.

C. D. M. Day, B.D.S., D.M.D., and H. J. Sedwick, D.D.S., School of Medicine and Dentistry, University of Rochester, Rochester, N. Y. Influences, on progress of dental caries, of fat-soluble-vitamin concentrates in tablet form were determined. The daily ration for each child was not less than 6000 U.S.P. units of vitamin A, and 1400 Steenbock units of vitamin D in the form of viosterol, superimposed upon ordinary diet; no attempt was made to regulate food intake. The experimental group comprised 147 children of both sexes; average age, 13 years at the beginning of the experimental period. A comparable group of 171 controls, receiving no vitamin concentrates, was kept under observation. Three inspections were made: first and final, in Oct. 1932 and Dec. 1933, respectively. The experimental group showed no improvement in respect to caries incidence, as judged by (1) average increase in percentage of affected teeth; (2) average percentage increase in number of cavities, or in number of cavities per mouth; (3) percentage increase in "average caries figure." The percentages of teeth that erupted and became carious subsequent to the first examination were similar in the two groups. The carious process was as active between second and third inspections as between first and second. Without otherwise improving the diet, administration of concentrates of vitamins A and D to children of this age, and within the period of this investigation, seemed to have no appreciable effect upon rate of carious processes in teeth already erupted, or which erupted during the experimental period. The necessity for radiographs in such investigations was demonstrated. (To be published in *J. of Nutrition.*)

79. Studies of Incidence of Dental Caries in Children at Puberty. *C. D. M. Day, B.D.S., D.M.D., and H. J. Sedwick, D.D.S., School of Medicine and Dentistry, University of Rochester, Rochester, N. Y.* This research is an outgrowth of nutritional research presenting opportunity for study of caries incidence in approximately 500 seventh-grade school children at the average age of 13. Complete data were obtained relative to number of (1) cavities disclosed by mirror and explorer, (2) additional cavities disclosed by radiograph, (3) carious teeth, (4) unerupted teeth, (5) extracted teeth, (6) fillings inserted, (7) filled teeth, (8) defective teeth (filled or carious); also relative (a) number of cavity types, (b) degree of caries frequency on

various tooth surfaces, and (c) degree of frequency of caries in individual teeth. Differentiation was also made between upper and lower jaws, sex, and nationality. Gross hypoplasia was noted in 7.6 percent of the group, with no greater susceptibility to dental caries. In most cases there was definite correlation between calcification period of the teeth and occurrence of various exanthemata of childhood. To study influence of heredity in caries incidence, data were obtained by actual observation of the parents of 325 children, with respect to number of teeth standing. Excluding teeth whose loss was due to causes other than decay, the parents of the children in a susceptible group showed an average loss of two teeth more per parent than those of a less susceptible group. Complete statistics on infant feeding in 370 cases indicated that breast-fed children showed scarcely less caries incidence than those artificially fed in infancy.

80. INFLUENCE OF HIGH-SUGAR DIETS UPON TEETH OF WHITE RATS. *C. D. M. Day, B.D.S., D.M.D., R. G. Daggs, Ph.D., and H. J. Sedwick, D.D.S., School of Medicine and Dentistry, University of Rochester, Rochester, N. Y.* Dental effects of excessive amounts of sugar were studied with many laboratory animals on high-sugar diets from an early age and for considerable lengths of time. Over 200 white rats were divided into five groups, one receiving basal diet alone; the other four groups, respectively, 20, 35, 45, and 55 percent of sugar added to the basal diet. The last group received additions of 3.3 percent of Osborne and Mendel's salt mixture, 3 drops of cod-liver oil, and 0.6 gm. yeast per rat per day. The sugar source was a popular brand of chocolate fudge, melted and mixed into a sticky adhesive mass with basal ration consisting of Purina Fox Chow. This diet was fed ad libitum for from 150 to 261 days, when the animals were autopsied and teeth carefully examined under a binocular microscope. Brown-plaque formation was always present in direct proportion to amounts of sugar in the ration, but no cusp, fissure, or interproximal caries occurred in any group. After 150 days, the animals in all groups were able to complete successfully the reproductive cycle, and there was no evidence of decay or defective tooth-formation in the second generation. Many decalcified sections were examined for evidence of the phenomena reported by Shibata. There was no abnormality in

development of enamel cells or dentin, and no bleeding or atrophy of pulp. The periodontal condition remained normal in all groups.

81. QUANTITATIVE EVALUATION IN ETIOLOGY. *J. A. Detlefsen, A.B., A.M., S.D., Swarthmore, Pa.* There has been much controversial, irrelevant and inconclusive literature and discussion in attempts to discover the proportional part, if any, of each of certain broad underlying causes (such as nature, nurture, heredity, constitution, environment, or certain portions or aspects of prenatal and postnatal environment) in the production of maldevelopment and disease generally, or malocclusion and caries in dentistry specifically. For a number of reasons we must have recourse to methods of analysis other than simple Mendelian. Identical twins alone give insufficient data with indeterminate solutions, because their similarity may be due as much to absence of ordinary, usual, important, prenatal and postnatal environmental differences affecting the individual as such, as to absence of original genetic differences. As the writer pointed out in 1928, analysis of correlations among other relatives in addition to identical twins, using path-coefficients, gives much additional information. Analysis shows that the ratio of heredity to environment (which reduces to $\frac{r_m - r_d}{1 + r_d - r_m - z}$, where r_m = monozygotic correlation, r_d = dizygotic correlation, and z = genetic correlation between sibs, a variable with limits), in determining antero-posterior relations between arches, ranges from 0.9 to 1.5. Environment peculiar to the individual (largely accidents of development) is much more important than common family environment (diet, economic status, etc.). The same is true in general of head-size. Therefore, there is no doubt whatever of the importance of heredity (genetic background) in the etiology of malocclusion. Similar analysis shows incidence of caries is apparently entirely non-genetic, but caused largely by family environment (diet and family hygiene?), a conclusion already qualitatively drawn from other sources. Extent of caries, in contradistinction to incidence, seems to have a definite but small genetic basis.

82. STUDY OF FIRST PERMANENT MOLARS IN SCHOOL CHILDREN. *J. A. Detlefsen, A.B., A.M., S.D., Swarthmore, Pa.* In examinations of 5134 white and 2403 colored school children, ranging from first to

eighth grades inclusive, the percentage of perfect sets of first molars decreased in successive school grades as follows:

White.....	26.2	6.1	3.2	2.6	2.4	1.8	1.3	1.2
Colored...	40.6	20.3	19.1	16.1	15.2	11.4	13.0	10.3

Each type showed the largest decrease immediately after the first school grade. Difference between races may be genetic; variation within a race may have a non-genetic background. The ratios of mandibular to maxillary extractions in whites and colored were 3.03 and 4.23, respectively. Extractions in whites were 3.2 times as frequent as in the colored. In whites, mandibular extractions increase most rapidly between fourth and fifth school grades, while the similar condition in the maxilla appears between fifth and sixth grades. There were no significant bi-lateral differences; but in developmental defects, pathological conditions, and extractions, the problem of the first permanent molar divides itself into mandibular and maxillary problems.

83. Malocclusion and Extraction of Teeth. *J. A. Detlefsen, A.B., A.M., S.D., Swarthmore, Pa.* In examinations of 4906 white and 2479 colored school children, ranging from kindergarten through eighth grade, malocclusion in whites, in every grade, in the totals, and in both sexes, was consistently more prevalent among children from whom temporary molars or first permanent molars, or combinations of these had been extracted than among children from whom no teeth had been extracted. Malocclusion among the colored showed the same situation, with a few exceptions in lower grades. Logically this indicates some association between prevalence of malocclusion and extraction. Coefficients of association, or correlation coefficients for a two x two-fold table, completely corroborate this; and are highest in third and sixth grades in white boys, and in third and seventh grades in girls, exactly where malocclusion and extraction combined are most prevalent. This does not imply absolute causation, because all four combinations of malocclusion and extraction and their contrary classes exist. In fact, as the data stand, malocclusion and extraction may be correlated as a result of common paths of causation; for extent of caries in the first permanent molar appears to have a small but

appreciable genetic background, and it is obvious that extent of caries rather than incidence determines extraction. Malocclusion itself has a prominent genetic background, a small part of which may incidentally come through extractions determined by extent of caries.

84. NUPERCAINE AS A TOPICAL ANESTHETIC. *Edward C. Dobbs, D.D.S., Dental School, University of Maryland, Baltimore, Md.* The efficacy of Nupercaine as a topical anesthetic was determined by applying it to oral mucous membranes, and testing degree of anesthesia in a given length of time. Students and clinical patients were subjects. The procedure was approximately uniform. The muco-buccal fold in the mandibular region was dried with a cotton sponge. A small cotton-pellet, saturated with Nupercaine solution, was put into the fold on the right side of the median line and left there for five minutes. Degree of anesthesia was then determined by piercing the mucosa with a sharp-pointed instrument, and comparing sensation with that in the opposite untreated area. Profound anesthesia was not obtained; only slight anesthesia was induced. A tingling sensation in mucous membranes, especially in the tongue, gave the impression that anesthesia was present. When a sharp instrument was passed through the mucosa, pain was felt in all cases. The most efficient preparation was made by diluting 4 percent aqueous solution of Nupercaine with an equal volume of 1-1000 solution of epinephrine hydrochloride. Nupercaine preparations may be useful in periodontoclasia treatments where a superficial anesthetic is sufficient.

85. ACIDITY IN PLAQUES. *James W. Etherington, D.M.D., and Harry C. Trimble, Ph.D., Harvard Dental and Medical Schools, Boston, Mass.* Observations have been made upon acidity actually existing *within* plaques. Using cotton rolls to isolate teeth to be examined, plaques were removed with a sterile steel scaler and transferred to a sterile tube, 5 cc. of redistilled water of known pH added, and disintegration effected with a sterile rod. With colorimetric technique the pH was determined immediately. For eighteen individuals, pH of plaques varied from 4.6 to 6.8, while pH of simultaneously obtained unstimulated saliva ranged between 6.2 and 7.2. In every instance the plaque interior was more acid than corresponding saliva. In eleven cases where caries was active, acidities of plaques averaged substantially the same as those of six cases where caries was inactive. In one case,

where caries is definitely active and plaques are rapidly renewed after removal, pH of plaques ranged between 4.6 and 4.9 in observations at intervals for two weeks, pH of the corresponding salivas varying from 6.5 to 6.7; after an improvement in mouth conditions, plaque-pH averaged 6.3 in observations at intervals for three months. More recently, with deterioration of mouth conditions, higher acid values for plaque-pH have again been obtained.

86. BIBLIOGRAPHIC METHODS IN DENTISTRY. *Ingo Hackh, Dental School, College of Physicians and Surgeons, San Francisco, Cal.* General discussion was followed by suggestions that the *Index to Periodical Dental Literature*, and its card service, would be much more serviceable if, instead of being confusing and uncertain "classified" arrangements, each were issued in the form of a "dictionary index" where "both the author-entries and subject-entries are in one alphabetical arrangement." To find a subject in a "dictionary index" requires "but a '*key thought*,' a *word* expressing that key thought, and the simple effort to locate that word in its *alphabetic order*—the *only* place where it could appear" (*J. Den. Res.*, 1934, *14*, 145; April).

87. DO BANDS OF SCHREGER REPRESENT VARIATIONS IN CALCIFICATION OF ENAMEL? *Franklin Hollander, Ph.D., Charles F. Bödecker, D.D.S., F.A.C.D., Eva Saper, B.A., and Edmund Applebaum, D.D.S., School of Dental and Oral Surgery, Columbia University, New York City.* Bands of Schreger, more-or-less perpendicular to enamel surface, occur in teeth of humans and some lower animals. Visible in ground sections—always by reflected, rarely by transmitted, light—they are usually interpreted as being optical manifestations of the angle at which enamel rods are cut, relative to their long axes, in preparing ground sections. Our attempts to confirm this explanation were unsuccessful in all but a few cases, although more than fifty sets of bands in unetched ground sections of human teeth were studied. When examined with a beam of reflected light, their appearance varied markedly with the direction of the beam relative to the specimen; when a Silverman Illuminator was employed to give full uniform illumination, their appearance was more regular. In a great proportion, the bands were visible also by transmitted light, though sometimes not so easily as by reflected light. Radiographic examination of ground sections—using the Grenz-ray (soft x-ray) technique pre-

viously reported by us (*Dental Cosmos*, 1933, *75*, 1097)—revealed them as alternating light and dark bands. Since it has not yet been possible to confirm the classical explanation, this last observation suggests that bands of Schreger are due to localized variations, of relatively small magnitudes, in calcification of enamel. (Aided by a grant from the Commonwealth Fund of New York.)

88. RELATIONSHIP OF pH, Ca, AND P TO SOLUBILITY OF ENAMEL. *Maxwell Karshan, M.A., Ph.D., and Theodor Rosebury, D.D.S., Medical and Dental Schools, Columbia University, New York City.* If caries is protected against access by saliva, the initial reaction involves principally acids of fermentation and salts of enamel. We studied effects, on powdered enamel, of buffers of lactic, succinic, and malic acids, without added Ca or P, to determine relationships at equilibrium of pH to dissolved Ca and P. Systems containing different amounts of titratable acid, all with enamel in excess, were shaken, and determinations made on aliquot parts removed at intervals up to the point of equilibrium. The results indicate that, (1) in lactate buffers, pH change at each time-level is strictly proportional to dissolved P at that level; (2) enamel is soluble over the entire acid range of pH; (3) the probable curve of solubility—dissolved P plotted against pH, both at equilibrium—changes direction between pH 5.0 and pH 4.0, solubility increasing slowly down to pH 5.0, rapidly below pH 4.0. This relationship appears to be constant and independent of relative concentration (and perhaps of kind) of acid, when enamel is present in excess. In lactate and succinate buffers, Ca values are about twice P values. Interpolations on the curve plotted with these data suggest that lactobacilli may alone be capable of causing solution of enamel under oral conditions. The following values thus obtained (P; mg. per 100 cc.) may be regarded as approximate indices of salt concentrations (dissolved from enamel) required to stop the reactions at these values for *pH: 7.0*—less than 1; *6.5*—2; *6.0*—5; *5.5*—12; *5.0*—38; *4.5*—90; *4.0*—200; *3.5*—460. Enamel thus appears to be about five times as soluble at pH 3.5, the level probably attainable by lactobacilli in the mouth (*Jour. Bact.*, 1932, *24*, 321), as at pH 4.5, the probable limit for other bacteria under natural conditions. In the case of bacteria other than lactobacilli, grossly inappreciable etching of enamel may cause accumulation of salts in sufficient concentration to stop the reaction.

89. Incidence of Dental Decay in a Colony of Living Rhesus Monkeys. *Henry Klein, D.D.S., Sc.D., Department of Embryology, Carnegie Institution of Washington, Baltimore, Md.* A total of 62 animals were examined, with explorer and mirror, for evidences of gross dental decay. (1) Of 30 monkeys having all third molars erupted, 7 showed dental decay as follows: *108*—Upper left and right first molars (left associated with wear, right not associated with wear —(interproximal), and lower left first molar (fissure). *51*—Lower right first molar; not associated with wear. *205*—Upper right first and second premolars; associated with wear. *79*—Upper right canine; associated with wear. *114*—Upper right first premolar; not associated with wear. *188*—Upper right and left first molars; fissure caries. (2) Of 32 animals not having their third molars erupted, one showed dental decay in lower milk molars; associated with wear.

90. Incidence of Macroscopic Dental Decay in Wild Rats. *Henry Klein, D.D.S., Sc.D., School of Medicine, Yale University, New Haven, Conn.* Of 69 wild rats, 39 adults showed dental decay in lower molars. The remaining 30 were young individuals (small size), and showed no gross dental decay. The rats were collected from traps placed about city dumps.

91. Self-correction of Malocclusions. *G. Korkhaus, M.D., Dental Clinic, University of Bonn, Bonn, Germany.* In 1926 Kantorowicz reported conditions of self-correction of certain malpositions, which were controlled by serial researches on school children in Bonn. Later we found further self-corrections of abnormalities in development, and discovered many interesting facts regarding related mechanisms. These first findings, of systematic and yearly renewed serial investigation of school children presenting malocclusions of the temporary denture, corroborated the statistical certainty that increase in frequency occurs in certain types of malocclusion between the ages of 6 and 12, while in certain other types frequency decreases. Serial investigations cleared up the mystery at least for lower prognathy: certain cases correct themselves without treatment during replacement of the anterior teeth. By statistical investigations the author found decreased frequency of other types of malocclusion (protrusion from sucking, open-bite, crossed-bite); and regular series of models of these types with undoubted self-correction were obtained as soon as

interest was focused on these matters. There is no doubt as to the extraordinary and far-reaching importance of these observations, not only for conceptions of the genesis of anomalies, but also for orthodontic prophylaxis and early treatment. Favorable or unfavorable influences can, in a short time, thoroughly change dental arches and occlusion. In jaw development, more complicated and subject to more changes than that of almost any other organ, various influences play a part. To growth impulses in the jaws must be added displacing and growth-promoting influences of the teeth, under development and in eruption; also developmental influences of neighboring facial bones (nose, cheek-bones). Collective action of these various tendencies, which either reinforce or counteract one another, depends upon the building plan of the individual as fixed in the germ, upon his ever-changing particular constitution; which plan not only determines the course of physiological development but also rules its progress in typical reactions against outside interferences (e.g., premature loss of teeth by extraction or caries).

By freeing oneself in the concrete case from expecting a set course of development, defined by strict laws, much will already have been gained. Nothing is more unsettled and more variable than succession of teeth, the "normal" course of which is so rare that it might almost be termed "abnormal." The order of eruption of permanent teeth, their rise from the germ position into the dental arch, their positioning in proper contact with neighbors and opponents, and occlusal and articular changes resulting from varied position and direction of guiding planes, all these—to refer to only a few—call for special attention from the responsible dentist. Also developmental tendencies radiating from the periphery—from the body of the jaws and other parts of the facial skeleton—often become visible and their explanation is facilitated through improved methods of comparative profile diagrams (Hellman, de Coster), or of modern teleroentgenography (Hofrath, Simpson). We must try, with great humility and discretion, to discover from Mother Nature which way she goes and her reasons therefor, which we often cannot grasp at first. Knowledge of factors that *threaten* development of the denture is just as important as knowledge of tendencies that *favor* development, and which can be brought into play at the right time only through rational division of the work. We

do not yet know much that is certain about the nature of developmental tendencies. We distinguish true diastema from false; we also know retarding factors that resist self-correction in abnormalities which possess a tendency towards correction, and, by eliminating them (freeing a locked bite, expansion), we can make the way clear; but the inner interdependence of many of these influences is not evident. We can readily understand that eruptive energy of permanent incisors is sufficient to correct even a strongly marked open-bite of the temporary denture, assuming there is no narrowness of jaws and that finger-sucking habits have been cured. But why correction should come about in isolated cases of lower prognathy of the deciduous denture is a puzzle. And although we try clinically to divide our cases of lower prognathy into those with "mandibular projection through growth" and those with "locked bite"—though our efforts have been very useful in early treatment—a general view of self-corrected cases of this type hitherto observed does not reveal any absolute uniformity. The dentist who is interested in biological problems will look forward with great expectation to the answers to these questions. He will also, in the future, observe deciduous dentures of his patients with other eyes. *The responsibility for watching over development of the jaws, for prevention of oncoming factors of danger, and for use at the proper time of favorable natural developmental tendencies, are the basis of the great joy and blessing of orthodontic prophylaxis and early treatment.* Undoubtedly knowledge of self-correction of malpositions and malocclusions has opened the way for this desirable activity.

92. Diagnosis of Unilateral Distal Occlusion; Interesting Conditions in a Pair of Univetelline Twins. *G. Korkhaus, M.D., Dental Clinic, University of Bonn, Bonn, Germany.* An asymmetrical sagittal deviation, like unilateral distal occlusion, may be localized in upper or lower jaw, and in either the body of the jaw or the alveolar process. Separation of both regions in the maxilla not only is very difficult but also is practically unnecessary, because direct therapeutic influence on the body of the upper jaw is not possible. Asymmetries concerning the maxilla are cleared up by sagittal and transverse comparison of symmetry by means of the median raphe plane. More important is exact diagnosis in the mandible. By constructing a lower median plane of the mandible, we must create a base of mensura-

tion which, in spite of lability of the marks (lingual and labial frenulum), separates the alveolar and mandibular deviations. The deviation of lower median plane compared to raphe median plane clears up very distinctly the deviation of position of the mandible, which is suspended and movable. Careful analysis of the en-face photograph demonstrates, in the deviation of the marks of the lower face, the part of the mandibular body in the anomaly and should be used more frequently. Mensuration of the sagittal dimensions (ear lines) may support the judgment. Differentiation of symptoms in the mandible is very important in practice, the therapeutic means for every kind of deviation being different.

93. Great Importance of Teleroentgenograms of the Face for Science and Practice. *G. Korkhaus, M.D., Dental Clinic, University of Bonn, Bonn, Germany.* The denture and its function take active and dominant parts in shaping and forming the facial skull. Unfortunately, we possess only superficial knowledge of visible peculiarities in structure of skulls of different races and their crossbreeds, of different types of constitution, and also as to sex and age. At a time when nothing could be learned about real form and thickness of the covering soft parts, genetic analysis of facial parts, singly and in coördination, could not be very successful. Also in orthodontia exact knowledge of influences upon skull and face, by pathological factors in the origin of jaw anomalies or by abnormal function of the denture, remains obscure—influences which lead not only to well known orthodontic irregularities, but also to typical deformities of the facial skull. Teleroentgenography (method of Hofrath) permits deeper knowledge, and its possibilities cannot be foreseen. It gives undistorted pictures, with the finest simultaneous reproduction of the soft parts of profile and facial bones. These roentgenograms show all interesting details of structure and composition of facial skull; all connections between alveolar process and jaw; relations to prosthion and subspinal, to infradentale and gnathion; form of jaw angle and proportion of mandibular processes; signs of certain favorable or unfavorable tendencies in development—all can be surveyed with perfect clearness. One can also draw the orbital projection (orbital-plane of Simon), attaining at the same time a plastic impression as to how the denture is fitted into the skull. When different orthodontic

anomalies are sufficiently investigated with regard to peculiarities of skull structure that are visible on teleroentgenograms, we shall advance toward the goal of natural individual development. This method affords remarkable insight into the nature of pathological development, and permits observation of development and of results of therapeutic endeavors. Teleroentgenography, as undoubtedly the best method to determine maxillo-facial relations, will become a very important instrument in orthodontia.

94. Dangerous Stages in Development of the Denture. I. Premature Loss of Temporary Teeth. *G. Korkhaus, M.D., Dental Clinic, University of Bonn, Bonn, Germany.* Serial studies of numerous children, who could be controlled in periods of one year, have given interesting evidence of dangers that threaten jaw development. Protection against these dangers is the task of orthodontic prophylaxis and early treatment—the new sphere of orthodontia that should be well known to all practising dentists. Premature loss of temporary teeth, during change of teeth, plays a special and disastrous rôle—and this with regard to frequency as well as effect. Statistical investigations have shown that of 1000 (Bonn) school children 14 years old, 225 showed anomalies rated as "consequences of extraction." In more than 20 percent, at the age of 6 in the first school-year, a second temporary molar was already missing—a tooth that should have remained until eruption of the second molar, i.e., until the age of 12 or 13.

Every erupting tooth shows an extraordinary tendency to make room for itself, causing, when there is lack of space, displacement or resorption of adjoining teeth. Eruptions of first molars and permanent incisors take place about the same time, i.e., between sixth and ninth years. Between the two zones of eruption, the group of temporary side-teeth acts as a kind of "support zone," and holds the occlusion and height of the bite. From both sides this group is placed under strong pressure, which is evidenced whenever this "support zone" collapses. If any temporary side-tooth has been lost or reduced in size by caries, the erupting six-year molar presses forward and thereby may turn, tilt, and force the second temporary molar into a palatinal direction. The expansive influence of incisors at their eruption is felt in a distal direction. At the loss of the first temporary

molar, for instance, the temporary canine may be forced some millimeters in a distal direction; and physiological widening of the frontal dental arch fails to occur, resulting in hindrance of frontal jaw-growth, and direct distal shifting of teeth toward the gap. But in spite of an intact "support zone," there are similar consequences when permanent teeth are extremely large in comparison to size of jaws and to arch of temporary teeth, and if jaw development has not adapted itself to size of teeth. Under such conditions, wing-teeth of the "support zone" are undermined by erupting teeth. Under the influence of erupting lateral incisors, temporary canines may, for instance, be spontaneously resorbed and lost. The six-year molar, having attained a rather mesial direction owing to lack of room, may also in this early stage at first resorb the distal root of the second temporary molar, and finally cause loosening and complete loss of this tooth. As a consequence of premature loss of temporary side-teeth, lack of space averaging a premolar-width may result—but this lack may be increased to the width of two premolars. Canines and second premolars fight for their positions. In this struggle the losing tooth finds no room in the row of teeth, and becomes a dystopy of either the canine or the premolar; that is to say, a prominent canine, or a palatinal or lingual shifting of the second premolar.

95. New Instrument for Comparative Anthropological Measurements of Dento-facial Relations. *G. Korkhaus, M.D., Dental Clinic, University of Bonn, Bonn, Germany.* A new measuring instrument, similar to the headspanner of Todd and Hellman and to the prosoprometer of Bennett, makes it possible to measure the "ear rays" in a very simple way. It is an improved modification of these instruments, adjusting the tragion as starting point for reliable measurements. Projective distances of the profile points to the tragion, and length of the mandibular processes, can be read off at once.

96. Cholesterol and Lecithin in Teeth and Saliva. *Frances Krasnow, M.A., Ph.D., Dental School, Columbia University, and School for Dental Hygienists, Guggenheim Dental Clinic, New York City.* Procedures for quantitative determination of lipid-P (alcohol-ether soluble P) and cholesterol in saliva and teeth were devised. In analyses of 40 specimens of saliva, lipid-P ranged from 0.1 to 0.4 mg. per 100 cc.; cholesterol, from 2.0 to 9.0 mg. per 100 cc. Thus far, for

teeth, only lipid-P was determined. In enamel and dentin from 15 teeth, content of lipid-P per 100 mg. was 0.5 to 2.8 mg., and 0.1 to 1.7 mg., respectively.

97. RACIAL AND INDIVIDUAL VARIATION IN CERTAIN FACIO-DENTAL RELATIONSHIPS. *Wilton M. Krogman, Ph.D., Medical School, Western Reserve University, Cleveland, Ohio.* Application of anthropometric technique to problems of facial development and individual diagnosis has resulted in formulation of "laws" and definite statements of dento-facial relationship. While a National Research Council Fellow, studying with Sir Arthur Keith at the Royal College of Surgeons of England, the writer measured 355 adult skulls (male): Anglo-Saxon, 89; French, 33; Italian, 61; Tibetan, 32; Burmese, 35; Moriori, 46; Batatela, 59. The skulls were placed in the Reserve Craniostat, and all landmarks and measurements employed in analysis of facio-dental relationships transferred to millimeter paper. All craniometric (skull) measurements were, by corrections for tissue thickness, calculated in terms of cephalometric (head) measurements. Variability of all measurements was stated in statistical terms; for facial length in adult skulls, from porion (mid-point of upper margin of external auditory meatus) as a center, it is relatively little. These dimensions may be accepted as reliable indications of forward growth of the face. Further, craniostatic tracings may with confidence be superimposed upon each other in the Frankfort Horizontal, or any variation of it based on porion, to give comparability. There is no dependable relationship between any one facial point, or plane passing through that point, and any tooth in either head (cephalometric orbital plane) or skull (craniometric orbital plane). Specifically, the orbito-canine relationship is not constant and the orbital plane is extremely variable. (To be published in *J. Den. Res.*)

98. RELATION OF NUTRITION TO DENTAL CARIES AMONG ESKIMOS AND INDIANS IN ALASKA AND NORTHERN CANADA. *Weston A. Price, D.D.S., M.S., F.A.C.D., Dental Research Laboratory, Cleveland, Ohio.* Since all primitive peoples have tended to be relatively free from dental caries, often highly so, they logically become controls for the great human experiment of modernization through progressive civilization. The procedure in these investigations, in 1933, has been to seek groups as nearly primitive as could readily be found, and to study their living

and dental conditions; then, by working back toward civilization, to note significant changes that occurred at the locality where individuals became susceptible to caries. Accordingly, *groups of Eskimos* in isolated locations in Western Alaska, and of isolated Indians in Northern Canada inside the western watershed, and individuals and groups of these tribes at places of contact with modern civilization, were studied. In all 786 individuals were included, and 21,215 teeth examined. In the most isolated and primitive groups among Eskimos, incidence of caries was 0.09 percent of all teeth examined; namely, 2 teeth out of 2138 in 72 individuals. For members of these groups living at places of contact with modern civilization, 13 percent of all teeth had caries. In this group 81 individuals had 2254 teeth, of which 394 were carious—a 144-fold increase. This latter group was at a place where a government supply-boat calls once a year. *For Indians* of the interior: in three of the most primitive groups, of 76 individuals having 2144 teeth, not a single tooth had been attacked by caries. In another nearly primitive group, of 11 individuals having 320 teeth, 4 teeth were carious. For these four groups of 87 individuals having 2464 teeth, and 4 teeth carious, the percentage was 0.16. For the groups of Indians at the place of contact with modern civilization, incidence of caries was 21.5 percent—405 out of 1878 teeth in 70 individuals were attacked by caries, a 134-fold increase. For *both Eskimos and Indians:* when a critical study was made of living conditions of immune bands as compared with susceptible bands, little difference was found in any factor excepting items of diet. These differences were in every case characterized by increase in caloric value of foods in proportion to mineral content, and marked decrease in fat-soluble activators, for groups that lost high immunity.

Foods constituting a typical day's menu for immune Eskimos provided the following quantities of activators and minerals (*grams*): +++ fat-soluble activators; Ca, 2.14; P, 5.7; Fe, 0.1; Mg, 1.27; Cu, 0.0312; I, 0.000131—on a basis of 3000 calories per day due to climate. Typical daily menus of immune Indians provided the following quantities of activators and minerals (grams): +++ fat-soluble activators; Ca, 2.3; P, 6.61; Fe, 0.186; Mg, 0.68; Cu, 0.0254; I, 0.000024. The menus that replaced some of the natural diet, and contained much white flour, sugar, and highly sweetened foods, provided the following

fat-soluble activators and minerals (grams): + fat-soluble activators; Ca, 0.39; P, 1.14; Fe, 0.067; Mg, 0.16; Cu, 0.0167; I, 0.00000276. The *percentage* reduction in minerals, for typical menus used by Eskimos, follows: Ca, 81; P, 80; Fe, 30; Mg, 86; Cu, 46; I, 97. The reduction for Indians was: Ca, 83; P, 82; Fe, 63; Mg, 76; Cu, 34; I, 88. Fat-soluble activators for the Eskimos and Indians were reduced from +++ to +. Of twenty highly modernized Indian communities in the interior of Canada and on the coast, the average for seven groups was 40.8 percent of all teeth attacked by caries of all ages examined. (*Dental Digest*, Feb.–July, 1934.)

99. New Light on the Etiology of Facial Deformity and Dental Irregularities from Field Studies among Eskimos and Indians in Various Stages of Modernization. *Weston A. Price, D.D.S., M.S., F.A.C.D., Dental Research Laboratory, Cleveland, Ohio.* Many theories have been propounded for the cause of facial deformities and irregularities of teeth and dental arches. This problem has been studied by making critical examinations of the most primitive groups of Eskimos in Western Alaska, and of isolated bands of Indians inside the divide in northern Canada. In all primitive groups of both races, there was close conformity to racial types in facial expression, contours of dental arches, and arrangement of teeth. No leaning or impacted third molars were found. A few cases of supernumeraries were observed. In groups at places of contact with modern civilization, many individuals had striking defects in facial development consisting usually of lack of development forward either in the middle third of the face with narrowing of the upper dental arch, or in the lower third of the face with narrowing of the dental arch, or both defects. The principal and only evident change in living conditions at places of contact with modern civilization was partial displacement of native food by imported food. A critical study of full bloods, and mixed bloods with whites or of Eskimos with Indians, revealed a percentage of these characteristic deformities as high in full bloods as in mixed bloods, and quite similar defects were revealed among both Indians and Eskimos. The deformities were related in part to the period in which nutritional deficiency occurred. In most severe cases, mothers, during both gestation and lactation, had partially displaced native diet with foods of modern civilization, and their children re-

ceived during infancy and childhood considerable portions of these imported foods. The differences between the diets of those with normal development, and those with incomplete or abnormal development, of bones of the face and dental arches, were those that produced loss of immunity to dental caries (abstract 98), but the divergencies from "normal" were not constant in relative degree. (*Dental Digest*, Feb.–July, 1934.)

100. Some Causes for Changes in Susceptibility of Eskimos and Indians to Acute and Chronic Infections upon Contact with Modern Civilization. *Weston A. Price, D.D.S., M.S., F.A.C.D., Dental Research Laboratory, Cleveland, Ohio.* It has been generally known, and apparently accepted as essential, that primitive races upon contact with modern civilization tend to break more readily with tuberculosis, arthritis, and various other chronic and acute infections. However, there has been little evidence on the cause of increased susceptibility. These studies have included examination of Eskimo and Indian patients in hospitals, as well as individuals ill in isolated shelters, to ascertain whether there is a relationship between defective physical development and lowered immunity to acute and chronic infections. A typical condition was found in the Juneau government hospital for Eskimos and Indians. Twenty individuals, under 21, were bedridden with pulmonary tuberculosis. Examinations were made of facial development, size and contour of dental arches, arrangement of teeth, and incidence of dental caries; facial and dental conditions were recorded photographically. In each of the twenty, there was marked under development of parts of the face and dental arches, with gross irregularity of teeth, indicating that all had suffered from interference with normal growth due to nutritional deficiency during infancy and childhood. Some, owing to abnormally small nares from lack of bone growth, were very marked mouth-breathers. This interference with normal ventilation would of itself constitute a handicap to lung development. The chief significance, however, was interpreted to be evidence of developmental injury related not only to physical structures but also to defensive chemical mechanisms that are essential for combating tubercular infections. In several places, others who were suffering from arthritis or tuberculosis showed similar evidence of nutritional injury in the growth period.

This correlation accords with conditions the author found in field studies in Switzerland and the Hebrides. The etiological change in nutrition was undue increase in caloric value of food in proportion to its mineral and activator contents, as reported in abstract 98. (*Dental Digest*, Feb.–July, 1934.)

101. STUDIES OF LACTOBACILLI IN RELATION TO CARIES IN RATS. I. EFFECT OF FEEDING LACTOBACILLI WITH CARIES-PRODUCING DIETS. *Theodor Rosebury, D.D.S., Maxwell Karshan, M.A., Ph.D., and Genevieve Foley, M.A., Medical School, Columbia University, New York City.* We have reported (1)[7] that caries did not occur when lactobacilli were fed to rats, in adhesive gum-tragacanth paste, with various diets that did not in themselves produce caries; and (2) that constant oral presence of these bacteria does not result in caries even though the diet is deficient in Ca and vitamin D, and contains excess of glucose. Rat-mouth lactobacilli grow less actively in cultures and produce less acid from carbohydrates than human-mouth strains. To determine whether this difference is significant, ten rats were placed at weaning on No. 2 deficient coarse-rice caries-producing diet (3), and eleven on No. 6 adequate diet (3), and in each case daily fed freshly isolated smooth-strain of lactobacilli from human caries in saline suspension from 24–48 hour broth-culture. The animals were killed after 36 to 103 days under these conditions. Incidence of fissure caries, as determined microscopically, on the deficient diet, was 9 animals (90 p.c.), 15 teeth (50 p.c.), index (4) 6.5; on the adequate diet, 3 animals (27 p.c.), 5 teeth (15 p.c.), index 0.6. These values are not greater than averages for deficient and adequate caries-producing diets in general: deficient diets (82 animals)—94 p.c. of animals, 61 p.c. of teeth, index 8.3; adequate diets (41 animals)—51 p.c. of animals, 32 p.c. of teeth, index 3.3. Addition of human-mouth lactobacilli to deficient or adequate caries-producing diets did not in either case increase incidence of caries.

102. STUDIES OF LACTOBACILLI IN RELATION TO CARIES IN RATS. II. ATTEMPT TO IMMUNIZE RATS, ON CARIES-PRODUCING DIETS, AGAINST LACTOBACILLI. *Theodor Rosebury, D.D.S., Genevieve Foley, M.A., and Samuel Greenberg, D.D.S., Medical School, Columbia Uni-*

[7] References for abstracts 101, 102, and 103 are assembled at the end of 103.

versity, New York City. Two groups of rats receiving, respectively, coarse (10-mesh) rice-deficient (3) diet (diet 3) and 10-mesh rice-adequate (3) diet (diet 16), were immunized against lactobacilli, and incidence of caries compared with unimmunized controls subjected otherwise to the same conditions. Of 8 rats placed on diet 16 at weaning, 4 received intraperitoneal injections of living lactobacilli in saline suspension prepared from a mixture of 1 smooth human-caries strain and 2 rough and 1 intermediate rat-mouth strains. Each injection-dose of 0.5 cc. contained 1200 million to 2500 million organisms. Each animal received fourteen injections during the first four weeks. Eight additional rats were kept on stock diet for two weeks after weaning, and then transferred to diet 3. Four of these received injections as above during the two weeks on stock diet and the first two weeks on diet 3. The latter group were killed after 98–107 days on diet 3; the former, after 123–128 days. Sterile subcutaneous abscesses resembling those described by Jay *et al.* (5) developed in several cases, 24 hours after injection, but no other ill effects were observed. At intervals, serums of all animals were tested for agglutinins against each of the four strains used, but the results, although of the expected order, were not convincing because of apparent inagglutinability of the human strain and persistent autoagglutination of the rat strains. Despite these findings it seems unlikely that, as Jay *et al.* (5) reported, lactobacilli are not antigenic for the rat; some degree of immunologic response to injection of living microörganisms may be assumed. Lactobacilli persisted in the mouths of these rats. The incidence of caries, determined microscopically, was for *diet 16*—immunized, 3 animals (75 p.c.), 4 teeth (33 p.c.), index 3.5; unimmunized, 2 animals (50 p.c.), 3 teeth (25 p.c.), index 1.2; for *diet 3*—immunized, 2 animals (50 p.c.), 2 teeth (17 p.c.), index 0.8; unimmunized, 2 animals (50 p.c.), 3 teeth (25 p.c.), index 1.8. The low incidence on diet 3 may have been due to delay in starting the diet—14 days later than usually. The results do not suggest that immunization with living lactobacilli protects against experimental caries in rats.

103. Studies of Lactobacilli in Relation to Caries in Rats. III. Influence of Coprophagy on Aerobic Mouth Flora. *Theodor Rosebury, D.D.S., Genevieve Foley, M.A., Samuel Greenberg, D.D.S., and Frank Pollock, B.S., Medical School, Columbia University, New*

York City. There is little evidence to show that lactobacilli are etiological factors in experimental rat caries, unlike caries in man; but constant presence of lactobacilli in rat mouths prevents their exclusion as causative agents. A crucial test requires elimination of lactobacilli from the rat mouth. The rat is coprophagous, and routine measures such as use of wire-screen cage-floors cannot prevent fecal contamination of the mouth. Both mouth and intestine contain abundant *B. coli* and lactobacilli. This experiment was an attempt to determine whether mouth flora would change if fecal contamination were prevented. An immobilizing device was designed, after preliminary tests, consisting of a screen floor bearing a plywood partition perforated to fit the animal loosely behind the pectoral girdle; to the rear of the partition was fastened a short tinned iron-tube lined with thin leather and open above to permit adjustment of its diameter. The animal was placed so that forelegs were free in front of the partition and hind legs free behind the tube, and fastened with a rawhide halter chained to the front of the partition. Eight animals after weaning were placed in these devices in individual cages, and fed stock diet (2) previously sterilized by dry heat at about 100°C. for three hours. Four litter-mates were kept under similar conditions, but were not immobilized. Every second week for eight weeks the floras of mouth and feces of all animals were studied by culturing in 1 p.c. dextrose casein-digest broth at pH 4, 5, and 6, and on blood agar, Endo's medium, and 1 p.c. dextrose agar. Both *B. coli* and lactobacilli persisted in the mouths of all animals throughout the eight weeks, and generally no constant difference was found between the floras of mouth and feces. Since the device employed appeared successfully to prevent fecal contamination of the mouth, it may be concluded that, whatever influence the intestine may exert on mouth flora in early life, continual contamination is not necessary to maintain it. Further attempts to eliminate lactobacilli from the rat mouth are in progress. *References* (for abstracts 101, 102, 103): (1) Rosebury and Karshan: *J. Den. Research*, 1931, *11*, 121. (2) Rosebury and Foley: *Ibid.* (in press). (3) Rosebury, Karshan, and Foley: *Ibid.*, 1933, *13*, 379. (4) Rosebury, Karshan, and Foley, *J. Amer. Den. Assoc.* (in press). (5) Jay, Crowley, Hadley, and Bunting: *Ibid.*, 1933, *20*, 2130.

104. STUDIES IN THE RAT OF SUSCEPTIBILITY TO DENTAL CARIES. IV. FURTHER STUDIES OF THE ETIOLOGY OF FISSURE CARIES. *Theodor Rosebury, D.D.S., Maxwell Karshan, M.A., Ph.D., and Genevieve Foley, M.A., Medical and Dental Schools, Columbia University, New York City.* The four stages of caries in rats previously described (1) were expanded to ten. Each stage is defined and illustrated in the complete report (2). The numerical rating scale (1–10) thus formulated permits averaging individual values to derive comparative indices. Using this scale, results obtained with 82 animals on deficient caries-producing diets, and 41 animals on adequate caries-producing diets, are recapitulated. Results for individual deficient diet-groups are strikingly constant; those for adequate diet-groups, less so. Incidence of caries was lower among adequate-diet groups; the difference appears to be an effect of retardation by some dietary factor: rats on adequate diets for a longer period present an incidence equivalent to that on deficient diets in a shorter period. Additional experiments demonstrated that corn may be substituted for rice in deficient diets with at least equal effect; that glucose or sucrose may similarly be substituted for dextrin; and that caries may be produced with rice in absence of added carbohydrate. In the diets used, cereal particles thus are the essential caries-producing ingredient. Addition, to deficient caries-producing diet, of Ca, P, and cod-liver oil in different amounts and combinations did not, in general, prevent occurrence of caries; but some combination of these substances appears responsible for retardation of caries on adequate diets. The character of this combination, and the mechanism of its action, cannot yet be determined from the data. No correlation was found between degree of calcification of teeth or bone and incidence of caries, or between levels of Ca or P in blood and incidence of caries. Discussion of the relationship of this work to studies of others, and to the problem of dental caries in man, is included in the report. *References*—Rosebury, Karshan, and Foley: (1) *J. Den. Research*, 1933, *13:* 379; (2) *J. Amer. Den. Assoc.* (in press).

105. FORM, SIZE, AND POSITION OF MAXILLARY SINUS AT VARIOUS AGES STUDIED BY MEANS OF RADIOGRAPHS OF SKULLS. *H. Jobe Sedwick, D.D.S., School of Medicine and Dentistry, University of Rochester, Rochester, N. Y.* This study is based upon 346 cases, rang-

ing in age from 3 to 80 years, including some Pre-Columbian Indian skulls, and comprises observations and measurements of transverse width, vertical height, and antero-posterior length of sinuses; their relation to floor and sides of nasal cavity; and classification of shape. The sinus varies greatly in shape, size, and position, not only in different individuals but also in each side of the same individual; it reaches its maximum size during the third decade of life; in later decades there is a definite tendency toward assumption of triangular form; when it is triangular, the position of its base varies. The relation between floor of sinus and that of nasal cavity varies. The sinus, however, is in close proximity to the sides of the nasal cavity. The only observed difference between sinuses in white and Indian skulls is shorter vertical height in the latter. Average sinus measurements are: height, 34 mm.; width, 25 mm., antero-posterior length, 39 mm.; males and females show no difference. In the averages for certain decades, however, sinuses of females are somewhat smaller. (To be published in *Int. J. of Radiology and Physical Therapy.*)

106. Relation of Teeth to Floor of Maxillary Sinus at Ages 11 to 16, Studied by Means of Radiographs. *H. Jobe Sedwick, D.D.S., School of Medicine and Dentistry, University of Rochester, Rochester, N. Y.* This study, based upon radiographs of 450 seventh-grade students in a public school of Rochester, shows that (a) the layer of spongy bone between root apices and floor of the maxillary sinus varies in thickness, and (b) the proximity of apices depends upon the thickness of this layer. Teeth bearing most constant relation to the sinus floor are, in order, second bicuspid, first molar, second molar, first bicuspid; those most commonly found at the anterior border of the floor are the cuspids; those most commonly found below the floor are first bicuspid, second bicuspid; those that most often touch the floor, or are close to it, are second bicuspid, second molar; those most frequently projecting into the floor are first molar, second molar. (To be published in *Dental Cosmos.*)

107. Observations on Skulls of Certain Pre-Columbian Indians Unearthed in New York State. *H. Jobe Sedwick, D.D.S., School of Medicine and Dentistry, University of Rochester, Rochester, N. Y.* This study is based upon Pre-Columbian Indian skulls unearthed in New York State during a recent field expedition of the

Rochester Museum of Arts and Sciences. These skulls gave evidence of almost every type of dental disease known to modern civilization. Attrition in various degrees, and developmental hypoplasia of enamel, of the teeth occurred in almost all cases. Alveoclasia, pulp exposure, and abscesses occurred in about half of the cases. With one exception, caries was found in all skulls. (To be published in *J. Den. Research.*)

108. HARD PALATES OF 450 CHILDREN AT PUBERTY. *H. Jobe Sedwick, D.D.S., and C. D. M. Day, B.D.S., D.M.D., School of Medicine and Dentistry, University of Rochester, Rochester, N. Y.* No manuscript submitted for publication.

109. EFFECTS OF FLUORINE UPON RATE OF ERUPTION OF RAT INCISORS, AND ITS CORRELATION WITH BONE DEVELOPMENT AND BODY GROWTH. *Margaret C. Smith, A.M., Ph.D., Department of Nutrition, University of Arizona, Tucson, Ariz.* Rates of eruption of lower incisors of rats on rations containing 0.05 or 0.1 percent of NaF were measured for ten weeks, and compared with eruption rates of litter-mate controls. Incisors of F-fed rats were chalky-white and corroded, and in several cases decidedly elongated. At these levels NaF decreased eruption rate: an average total eruption of 31.7 mm. during the 10-week period was recorded for control rats; for those on rations containing 0.05 and 0.1 percent of NaF, 27.7 and 16.8 mm., respectively. NaF also retarded rate of body growth, and lowered retention of Ca and P: when the ration contained 0.5 percent of NaF, rate of body growth, amounts of retained Ca and P, and eruption rate of rat incisors, were 89.1, 85, 84.3, and 87.3 percent, respectively, of the amounts for controls; at the higher level of F-feeding (0.1 percent NaF), effects were more pronounced—39.8, 44.2, 47.8 and 52.9 percent, respectively, of the amounts for controls. A possible relation between tooth eruption, body growth, and bone development is suggested (*J. Den. Res.*, 1934, *14*, 139; Apr.).

110. POLYISOMERISM OF THE HUMAN DENTITION. *M. Russell Stein, D.D.S., College of Dental and Oral Surgery, Columbia University, New York City.* Human dental polyisomerism manifests itself in the presence of similar parts, *isomeres*, in different teeth of the same dentition; results from de-differentiation of heretofore differentiated parts; tends to make teeth more alike. Increasing prevalence of

dominant morphological characteristics, which have pervaded the entire dentition, has probably been going on ever since the dentition lost its positive survival value and ceased to be a determining factor in evolution. The most striking polyisomeric feature is trilobulation of labial surfaces of anteriors and premolars, and of cusps of all posterior teeth. Some teeth, stable in size and form, seem to be genetically more conservative than others. The most variable teeth of the upper denture are lateral incisors, second premolars, and third molars, all appearing in diminutive forms. The changing tooth acquires characteristics of an adjacent differentiated group. (*J. Den. Res.*, 1934, *14*, 125; Apr.)

111. Association of Bacteria with Dental Calculus. *Walter E. Taylor, D.D.S., Rockefeller Fellow in Dentistry, School of Medicine and Dentistry, University of Rochester, Rochester, N. Y.* Calculus removed from mandibular incisors was studied by means of smears, micro-sections and cultures. Fourteen stained smears from crushed calculus, previously washed, showed Gram-negative cocci, fusobacteria, and leptotrichia. Micro-sections of calculus, from three different individuals stained by Gram's toluidin blue and hematoxylin-eosin stains, showed central network of thread-like organisms, and denser peripheral palisade-arrangement of leptotrichia-like elements. Only one section showed bacteria other than leptotrichia. Aerobic cultivations from the exterior of calculus deposits developed cocci, but from the interior there was no growth. Anaerobic cultivation, from both exterior and interior, produced cocci, fusobacteria, and leptotrichia. The last-named type was the predominant organisms in all cases.

IX. Data of Executive Proceedings

A. Action relating to the Journal of Dental Research

1. A standing Committee of Three, to consider matters relating to the *Journal of Dental Research*, had been created at the adjourned general executive session in May 1933. In Nov. 1933 this Committee received formal notice (a) of the vote of the editors of the *Journal* to recommend that ownership of the *Journal* be transferred to the Association; and (b) of the ensuing proffer by the existing management of the *Journal* to effect transfer in conformity with that recommendation, if and when the Asso-

ciation so desired. In Dec. 1933, the Committee recommended to the Council that the proffered ownership be accepted. (These facts and their significance were given in greater detail on pp. 1 and 2 of the *J. Den. Res.*, 1934, *14*; Feb.)

2. The Council, acting on this general report, (a) voted (Jan. 1934) to recommend to the Association that the proffered ownership of the *Journal* be accepted, and also (b) transformed and enlarged (Feb. 1934) the standing Committee of Three into a special Committee of Seven, to consider size and personnel of the first board of editors and also matters of management, the report of this enlarged Committee to be presented at the meeting of the Association in March, 1934.

3. At the executive session on March 17 (evening), the Association approved the Council's recommendation that the proffered ownership of the *Journal* be accepted. (*J. Den. Res.*, 1934, *14*, 68; April.)

4. Unfortunately, however, the Committee of Seven was not then ready to report on matters of personnel and management. Accordingly, the Association instructed the President to appoint a substitute committee, to consider ways and means and to report at the evening session on March 18. This committee was appointed during the morning session on March 18 and met in the afternoon.

5. Under the circumstances, the report of the substitute committee could not be prepared with adequate deliberation. It was adopted, after deletion of a portion, *subject to confirmation by the Council.* (The report is not summarized here because the Council adopted the alternative procedure indicated below.)

Addendum: ad interim action by the Council. The Council voted (Apr. 1934) (a) to table the report of the aforesaid "substitute committee," and (b) to instruct the Committee of Seven to perform the function requested of it in the Council's action in Feb. 1934 (item 2, above). The Committee of Seven responded promptly (May 1934) by recommending to the Council that the management of the *Journal* be entrusted (a) to a board of editors to consist of one representative of each section, to be elected by the respective sections, this board to select its own officers, committees, and other agents; (b) the five chief active officers of the Association to serve as the Acting Board of Editors pending organization of the permanent board. The Council recently (June 1934) adopted this report of the Committee of Seven, and so notified the sections, which are now electing their representatives. Meanwhile the existing management of the *Journal*, for the convenience and protection of the Association, is serving with the Acting Board of Editors in a procedure that will transfer complete management

to the Association as soon as transitional uncertainties can be removed and the Association is ready to assume all responsibilities.

B. LISTS OF THE OFFICERS, AND NEW MEMBERS, ELECTED[8]

a. Officers (1934–35)

HONORARY: *Vice-Presidents:* Evelyn Sprawson, London. Hermann Wolf, Vienna. Jan Jesensky, Prague.

ACTIVE: *President*—J. L. T. Appleton, Jr., Univ. of Pennsylvania. *President-elect*—Theodore B. Beust, Univ. of Louisville. *Vice-president*—William G. Skillen, Northwestern Univ. *Treasurer*—Bissell B. Palmer, Fifth Avenue Hospital, New York City. *Secretary*—William J. Gies, Columbia Univ. *Trustee of the Endowment Fund* (three years)—R. W. Bunting, Univ. of Michigan.

b. New members[9]

Amsterdam, Holland. SAMUEL F. GOTTLICH, D.D.S., Secretary, Association of Dutch Dental Surgeons. THEÓDOR E. DE JONGE-COHEN, D.M.D., Docent, Anatomy and Embryology, Univ. of Amsterdam. ELKAN SANDERS, M.D., Van Eeghenstraat 115.

Ann Arbor, Michigan. J. ORTON GOODSELL, D. D. S., Chief, Oral Surgery Section, St. Mary's Hospital, Saginaw, Mich. RICHARD H. KINGERY, B.S., D.D.S., Prof. of Prosthodontia, and GEORGE R. MOORE, D.D.S., M.S., Assistant Prof. of Orthodontia, Univ. of Mich.

Baltimore, Md. GEORGE M. ANDERSON, D.D.S., F.A.C.D., Prof. of Orthodontia, HAROLD GOLDSTEIN, D.D.S., Oral Diagnostician, and J. BEN ROBINSON, D.D.S., F.A.C.D., Dean of the Dental School, Univ. of Maryland.

Boston, Mass. FRANK H. CUSHMAN, B.S., D.M.D., F.A.C.D., Prof. of Operative Dentistry, and RAYMOND J. NAGLE, D.M.D., A.B., Instructor in Prosthetic Dentistry, Harvard Univ. JAMES C. HEALY, Ph.G., M.D., Director of Clinical Medicine, Dental School, Tufts College.

Budapest, Hungary. KÁROLY BALOGH, M.D., Docent, Stomatological Clinic, Univ. of Budapest. ISTVÁN BÁNHEGYI, M.D., Bacteriologist, Dental School, Univ. of Budapest. BÉLA BONYHÁRD, M.D., Assistant, Dental Department, Apponyi Policlinic. JÁNOS BRAND, M.D., Resident

[8] A list of the members, as of December 1, 1933, was published in the *Journal of Dental Research*, 1933, *13*, 530; Dec.

[9] Since the adjournment of the Chicago meeting new sections have been organized in Budapest, Hungary; Chengtu, China; and Johannesburg, South Africa.

Interne, Dental School, Univ. of Budapest. KÁROLY FERENCZY, M.D., Roentgenologist, Dental Dept., State Social Insurance Institute. DEZSÖ HATTYASY, M.D., Assistant, Stomatological Clinic, Univ. of Budapest. ELEK FÖLDI, M.D., Dentist, Erzsébet-Tuberculosis Hospital. OSZKÁR KAUFMANN, M.D., Assistant, Dental Department, Apponyi Policlinic. FERENC KÖSZEG, M.D., Research Associate, Dental Department, Apponyi Policlinic. ERVIN LANDGRAF, M.D., First Assistant, Stomatological Clinic, Univ. of Budapest. DÉNES B. MÁTHÉ, M.D., Chief of Technology, Stomatological Clinic, Univ. of Budapest. GUSZTÁV MORELLI, M.D., Docent, Dental School, Univ. of Budapest. RUDOLF REHÁK, M.D., Assistant, Dental Department, Apponyi Policlinic. HENRIK SALAMON, M.D., Prof., Medical School, Univ. of Budapest. BÉLA DE SIMON, M.D., Head of Dental Department, Apponyi Policlinic. LÁSZLÓ SUGÁR, M.D., Voluntary Assistant in Histology, Dental School, Univ. of Budapest. JOZSEF SZABÓ, M.D., Director, Stomatological Clinic, Univ. of Budapest. ISTVÁN VARGA, M.D., Assistant, Dental School, Univ. of Budapest.

Chengtu, China. H. BRUCE COLLIER, M.A., Ph.D., Assistant Prof. of Biochemistry, LESLIE G. KILBORN, M.A., M.D., Ph.D., Prof. of Physiology and Pharmacology, and ASHLEY W. LINDSAY, D.D.S., L.D.S., B.Sc. (Dent.), F.A.C.D., Prof. of Oral Surgery, West China Union Univ.

Chicago, Ill. CHARLES W. FREEMAN, M.S., D.D.S., F.A.C.D., Assistant Dean, Dental School, Northwestern Univ. ROBERT G. KESEL, D.D.S., M.S., Assistant Prof. of Therapeutics, Dental School, Univ. of Illinois. AUGUSTUS H. MUELLER, B.S., D.D.S., M.S., Assistant Prof. of Operative Dentistry, Loyola Univ.

Iowa City, Iowa. GEORGE S. EASTON, D.D.S., Instructor in Clinical Operative Dentistry, State Univ. of Iowa.

Johannesburg, South Africa. GEOFFREY FRIEL, B.A., L.D.S.I., Lecturer in Dental Pathology and Histopathology, S. S. HAYWARD, L.D.S., Instructor, J. C. M. SHAW, M.A., B.Den.Sc., D.D.S., Prof. of Dental Microscopy, and W. A. WILSON, L.D.S., R.C.S., Senior Visiting Surgeon, Dental School and Hospital, Univ. of Witwatersrand.

Milan, Italy. GIULIO CSERNYEI, M.D., Associate Prof., Univ. of Milan. SILVIO PALAZZI, M.D., Director, Dental Institute, Royal Univ. of Pavia.

New York, N. Y. FRANKLIN HOLLANDER, B.S., Ph.D., Research Associate, Dental School, and HARRY H. SHAPIRO, D.M.D., Instructor in Anatomy, Medical School, Columbia Univ. FREDERICK L. STANTON, D.D.S., Prof. of Preventive Dentistry, New York Univ.

Prague, Czechoslovakia. JAROMIR KŘEČAU, M.D., Chief, Operative Dentistry Department, Charles Univ. VÁCLAV F. NÁPRSTEK, M.D., D.M.D.,

Vice-chief, Operative Dentistry Department, State Dental Institute. ČESTIMIR PARMA, M.D., Chief, X-ray Department, State Dental Institute. JOSEF PŘIBYL, M.D., Chief, Operative Dentistry Department, State Dental Institute. FERDINAND ŠKALOUD, M.D., R.N.D., Chief, Orthodontia Department, Charles Univ. KAREL WACHSMANN, Sr., M.D., Formerly Chief, Orthodontia Department, Charles Univ. HANS WERMUTH, M.D., Oral Surgeon, German Univ.

Richmond, Va. HARRY LYONS, D.D.S., Prof. of Periodontia and Oral Pathology, Medical College of Virginia. JOHN B. WILLIAMS, Ph.G., D.D.S., F.A.C.D., Chief of Dental Staff, McGuire Clinic.

Rochester, N. Y. ALTON D. BRASHEAR, D.D.S., B.S., ROBERT E. BRAWLEY, D.D.S., B.S., OLIVER W. CLOUGH, B.Sc., D.D.S., WALTER E. TAYLOR, D.D.S., and GRANT VAN HUYSEN, D.D.S., Rockefeller Fellows in Dentistry, Univ. of Rochester.

Vienna, Austria. HERMANN MATHIS, M.D., Assistant, Dental School, Univ. of Vienna.

Washington, D. C. HARRY E. HARVEY, D.D.S., Phar.D., Commander in Dental Corps and Chief of Division of Dentistry, U. S. Navy. EUGENE R. STONE, D.D.S., 2040 Allen Place, N. W.

Zürich, Switzerland. WALTER HESS, M.D., Prof. of Histology, Univ. of Zürich.

Total number of new members, 64.

Total active membership (June 1, 1934), 362.

C. MEMBERS PRESENT AT ONE OR MORE SESSIONS

SECTIONS. *Ann Arbor.*—Brown, Bunting, Dixon, Goodsell, Kingery, Lyons, Moore, Rickert, Vedder, Ward. *Baltimore.*—Aisenberg, Robinson. *Boston.*—Boyle, Cushman, Miner, Nagle. *Chicago.*—Black, Blayney, Boulger, Brodie, Coolidge, Downs, Fink, Freeman, Gordon, Hatton, Kesel, Kronfeld, Logan, Mueller (A. H.), Mueller (Emil), Noyes (F. B.), Noyes (H. J.), Nylander, Pendleton, Schour, Skillen, Tylman, Welker, Willman. *Cleveland.*—Chase, Hill. *Columbus.*—Cottrell, Kitchin. *Halifax.*—Thomson. *Louisville.*—Beust, O'Rourke. *Minnesota.*—Armstrong, Brekhus, Gardner, Stafne, Waldron. *New York.*—Crawford, Gies, Rowe. *Philadelphia.*—Appleton. *Pittsburgh.*—Friesell (H. E.). *Richmond.*—Bear, Bradel. *Rochester.*—Bibby, Brashear, Brawley, Clough, Sedwick, Taylor, Van Huysen. *St. Louis.*—Lischer, Winter. *San Francisco.*—Becks. *Toronto.*—Husband, Webster. NOT YET A MEMBER OF A SECTION.—Bryan (Iowa City). Total—72.

INTERNATIONAL ASSOCIATION FOR DENTAL RESEARCH

Organized: New York City, Dec. 10, 1920. Of those at the meeting of organization, the following remain active members: Adolph Berger, Theodor Blum, G. W. Clapp, H. S. Dunning, W. J. Gies, H. W. Gillett, R. G. Hutchinson, Jr., T. P. Hyatt, Milo Hellman, F. C. Kemple, A. H. Merritt, B. B. Palmer, P. R. Stillman, L. M. Waugh.

General meetings have been held on this schedule: (1) New York, Dec. 21, '22. (2) Chicago, Mar. 7, '24. (3) Chicago, Mar. 20, '25. (4) Chicago, Mar. 26, '26. (5) New York, Apr. 19, '27. (6) Washington, Mar. 25–28, '28. (7) Chicago, Mar. 23–24, '29. (8) Toronto, Mar. 24–26, '30. (9) Memphis, Mar. 21–22, '31. (10) Columbus, Mar. 19–20, '32. (11) Chicago, Mar. 18–19, '33; adjourned executive session, New York, May 25, '33. (12) Chicago, Mar. 17–18, '34. *Next general meeting* (13): Chicago, Mar. 16–17, in coördination with the twelfth annual meeting of the American Association of Dental Schools, Mar. 18–20, 1935.

Objects (Const., Art. II): . . . "(a) To promote broadly the advancement of active research in all branches of dental science and in related phases of the sciences that contribute directly to the development of dentistry, and which add to the knowledge of the mouth and teeth and of their relations to the body as a whole; . . . (b) to encourage and facilitate coöperative effort and achievement by, and mutual helpfulness among, investigators in all nations in every division of stomatology; (c) to the end, particularly, that dentistry may render cumulatively more perfect service to humanity." (The Association has been using "dentistry" and "stomatology" as synonyms.)

Membership: total (June 15), 360. *Eligibility (Const., Art. 14, Sec. 1).*—"Any person who has conducted, and published an account of, a meritorious original investigation in dental science, or in any of the sciences contributory to stomatology, shall be eligible to membership in this Association, providing such person conforms to the recognized standards of professional ethics." *Election.*—New members may be elected *only at general meetings of the Association.* Membership in a section is secondary to membership in the Association as a whole. Removal of members from one geographic center to another does not affect their membership in the Association.

Endowment fund (as of April 21, 1934): $1,119.23. There have been no expenditures from this fund.

Divisions may be organized by the members in any nation. There are now divisions in Austria, Canada, China, Czechoslovakia, England, Hungary, South Africa, and the United States—8. *Sections* may be organized by the members in geographic centers within the divisions. There are now sections (26) in Vienna ('29); Halifax ('28), Toronto ('21), Winnipeg ('30); Chengtu ('34); Prague ('32); London ('31); Budapest ('34); Johannesburg ('34); Ann Arbor ('23), Baltimore ('33), Boston ('20), Chicago ('20), Cleveland ('30), Columbus ('32), Louisville ('32), Minnesota ('28), New Haven ('30), New York ('20), Philadelphia ('28), Pittsburgh ('28), Richmond ('33), Rochester ('33), St. Louis ('28), San Francisco ('24), Washington, D. C. ('31). The names of the secretaries are given on p. 2 of this cover.

Sectional meetings in 1933–34 (schedule subject to revision). Ann Arbor—May ?. *Baltimore*—Oct. 24, Nov. 15, Jan. 31. *Boston*—Nov. 6, Jan. 29, May 21. *Chicago*—Oct. 27, Jan. 26, May 18. *Cleveland*—Feb. 12. *Columbus*—Mar. 9. *Halifax*—Nov. 19, Jan. 25, Mar. 14. *London*—Oct. 18, Dec. 6, Jan. 24, Apr. 18. *Louisville*—May 11. *Minnesota*—Nov. 20, Jan. 22, Feb. 26. *New York*—Dec. 7, June 7. *Philadelphia*—Oct. 13. *Pittsburgh*—Oct. 2, Nov. 6, Dec. 4, Jan. 8, Mar. 19, May 7. *Prague*—Jan. 12, May ?. *Richmond*—Nov. 18, Apr. 18, May 26. *Rochester*— Oct. 13, 27; Nov. 10, 24; Dec. 8, 22; Jan. 5, 19; Feb. 2, 16; Mar. 2, 16; Apr. 13, 27; May 11, 25. *St. Louis*—Nov. 14, Jan. 9, Apr. 10. *San Francisco*—Nov. 16, Jan. 24, Feb. 28, Mar. 28, Apr. 25. *Toronto*—July 17, Sept. 12, Oct. 20, Jan. 18. *Washington*—May 3. *Winnipeg*—Feb. 7, May 28.

Journal of Dental Research: now the Association's official publication. See register of officers and editors on page 2 of this cover.

JOURNAL OF DENTAL RESEARCH

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Quotation from a letter to the honorary editors by the retiring management.—"We have endeavored to make the *Journal of Dental Research*, since its establishment in 1919, an exemplar of the best and most meritorious in non-proprietary publication of dental research. The honorary editors have contributed the strength of their approval and support of that effort, and have responded to many calls for assistance. We cordially thank you for the very valuable aid you have given. Your interest and sympathy have fortified the *Journal's* determination to attain its avowed objectives. Your cooperation, accredited in each issue as a public endorsement of our purpose, has facilitated the *Journal's* growth and enhanced its usefulness. The *Journal*, on your recommendation, is about to pass into the complete control of the International Association for Dental Research, which will receive it as a gift from the original management. The Council has voted to place the *Journal* under the direction of a board of editors representative of, and to be selected by, the sections of the Association. Each of you, as a member of the Association, will have opportunity to participate in the recurrent selection of these editors. It is deeply gratifying to us, as we formally sever our past relationship, that the *Journal*, as the official publication of the Association, will continue to have the abiding interest and individual support of its former honorary editors."—*William J. Gies, Executive Officer, Board of Editors.*

INFORMATION FOR PROSPECTIVE SUBSCRIBERS OR CONTRIBUTORS

THE JOURNAL OF DENTAL RESEARCH is dedicated to the advancement of research, and to the dissemination of knowledge, pertaining to the teeth and mouth and to their relations to the body as a whole. It publishes original investigations and reviews in these fields, and in the sciences allied with or applied to them. Although without a "policy," the JOURNAL represents an unwavering purpose to keep widely open the channel to freedom of *responsible* and *respectable* expression of truth and opinion, by individuals or organizations, without qualification by or for any views its editors individually may entertain. Issued bi-monthly, at the *ends* of the months of February, April, June, August, October and December, each volume contains at least 500 pages, for which the subscription price is $5.00.

THE JOURNAL OF DENTAL RESEARCH circulates widely among the most enlightened and progressive dentists and physicians, and among the leading libraries, thus assuring the degree and quality of publicity for its contents that the best dental literature merits. Therefore there can be no important occasion, except in very special instances, for the detailed presentation elsewhere of a paper published in this JOURNAL. Accordingly, to prevent waste of the JOURNAL'S resources in needless duplicate publication, and also to lighten the labors of students of the literature of dentistry, papers in this JOURNAL are not published in, or reprinted from, other dental journals, except for unusual professional reasons. Reprints in any number may be obtained at prices that will be quoted on request.

Address all communications relating to editorial matters to the JOURNAL OF DENTAL RESEARCH, 632 West 168th Street, New York City; business communications, to the JOURNAL OF DENTAL RESEARCH, Mount Royal and Guilford Avenues, Baltimore, Md.

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